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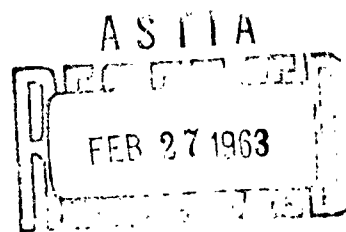
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# Abstracts of Personnel Research Reports:

## I. 1954-1957

Compiled By  
Helen Tomlinson  
Jo Ann Elson

Technical Documentary Report PRL-TDR-62-25  
December 1962



6570TH PERSONNEL RESEARCH LABORATORY  
AEROSPACE MEDICAL DIVISION  
AIR FORCE SYSTEMS COMMAND  
Lackland Air Force Base, Texas

Projects 7717, 7719

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## **ABSTRACT**

This volume gives abstracts of 145 technical documentary reports issued by the Air Force's personnel research laboratory January 1954 through December 1957. They cover research projects in selection, classification, and utilization of Air Force personnel. The reports are indexed by personal author, corporate author, and ARDC project number.

**This report has been reviewed and is approved.**

**Fred E. Holdrege, Col, USAF  
Commander**

**A. Carp  
Technical Director**

**Hq 6570th Personnel Research Laboratory**

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## ABSTRACTS OF PERSONNEL RESEARCH REPORTS: I. 1954-1957

### INTRODUCTION

Under various names and organizational affiliations, the Air Force unit now called the 6570th Personnel Research Laboratory has had a continuing central mission of developing procedures for the selection, classification, and utilization of Air Force personnel. Its reports have been published among the series of the several organizations to which the laboratory was attached: The Human Resources Research Center, Air Training Command (1949-1953); the Air Force Personnel and Training Research Center, Air Research and Development Command (1954-1957); Wright Air Development Center, Air Research and Development Command (1958-1959); Wright Air Development Division, Air Research and Development Command (1960-1961); the Aeronautical Systems Division, Air Force Systems Command (1961).

This is the first volume of a series compiling abstracts of the laboratory's research reports. It covers 145 papers published during the four years the laboratory was attached to the Air Force Personnel and Training Research Center.

The abstracts appear in order of the organizational series numbers. Entries following the author and title heading of the abstract give information further identifying the report and indicating where it is available:

**Publication date**, month and year; OR

**Journal reference** for papers originally appearing in a technical journal.

**Series number**, e.g., AFPTRC-TR-54-0. The *TN* series are *Technical Notes*; the *TR* series are *Technical Reports*.

**ASTIA Document number** for publications from July 1956 through 1957.

**Project and Task number**: Research areas identified by these numbers are given in the Project-Task index.

**Air Force Contract number and name** of the contracting organization are entered for contract-produced reports.

Three indexes are provided: a personal author index; a corporate author index which identifies reports produced under Air Force contracts monitored by the laboratory; and a project and task index which, although arranged in project number order, provides a rough subject classification. Reports are identified in the indexes by the serial number appearing in the left margin of the abstract entry.

Technical Documentary Reports Published in the  
AIR FORCE PERSONNEL AND TRAINING RESEARCH CENTER (AFPTRC) SERIES  
January 1954 - December 1957

- 1     **Gordon, Mary Agnes. Stability of final school grade. April 1954. (AFPTRC-TR-54-11) (Project 7700, Task 77006).** A method is proposed for assessing the stability of academic grades when they are used as the criterion of success in the validation of aptitude tests. It yields a significance ratio rather than a correlation coefficient and indicates whether the regression of the criterion on the predictor score remains stable throughout a series of graduating classes. Applied to 9 graduating classes of Control Tower Operator School, significant differences in level of regression were found, but differences were not sufficiently large to affect interpretation of the test validity.
- 2     **Thistlethwaite, D.L., Moltz, H., Kamenetzky, J., et al. Effect of basic training on learning by airmen of different intellectual ability. May 1954. (AFPTRC-TR-54-14) (Project 503-001-0009; Contract AF 33(038)-25726, University of Illinois).** Airmen differing in intellectual ability are compared in terms of their information at the beginning of the course and their gains in information during the course. It was found that there were significant increases in the knowledge of airmen in 9 of 11 content areas as a result of basic training. Intelligence correlated positively with initial level of information and some trainees at the outset knew more about what is taught during basic training than others did upon the completion of training.
- 3     **Mastropaolo, S., Carp, A., Erdmann, R.L., et al. A study of the relative effects of six-week and twelve-week experimental basic training programs on a sample of limited-aptitude airmen: Part I. Basic training analyses. Part II. Six-week follow-up analyses. September 1954. (AFPTRC-TR-54-36) (Project 7705, Task 77111).** This report examines the relative effectiveness for limited-aptitude airmen (Project 1000) of experimental basic training programs of 6 and 12 weeks' duration in terms of criteria obtained at the end of training and after 6 weeks of initial duty. The 2 training programs differed primarily in the inclusion of 45 hours of language arts and 45 hours of mathematics in the longer course. The 12-week group showed a small gain in arithmetic skills but none in reading or in language arts test scores. Compared for job proficiency, attitude, and adjustment measures 6 weeks after assignment, no differences appeared. A control group of normal-ability airmen working beside the limited-aptitude airmen was observed to be superior on job performance ratings and achievement test scores, but was somewhat inferior to the limited-aptitude groups on attitude and adjustment variables. For practical purposes the 12-week course was not superior to the 6-week course when applied to limited-aptitude airmen.
- 4     **Mastropaolo, S., Carp, A., & Erdmann, R.L. A study of the relative effects of six-week and twelve-week experimental basic training programs on a sample of limited-aptitude airmen: Part III. Eight-month follow-up comparisons. September 1954. (AFPTRC-TR-54-37) (Project 7705, Task 77111).** This second report of Project 1000 examines the relative effectiveness of 2 experimental basic training programs of 6 and 12 weeks' duration for a sample of limited-aptitude airmen. It compares their performance on the job 8 months after assignment. In general, the findings of the follow-up study are consistent with the first study in showing that the 2 training programs produce equivalent results. Though the control group of airmen working beside the limited-aptitude airmen were of marginal ability (Category IV), the controls had significantly higher aptitude and achievement test scores, were rated higher by supervisors for job proficiency, were declared more retainable, and were less prone to absent themselves from duty for reasons of sick call or hospitalization. The Project 1000 airmen conformed less well to Air Force standards in terms of delinquency reports, AWOL, courts-martial, but the majority did manage to stay out of trouble and were declared retainable by supervisors. Extending their basic training did not improve the situation, within the limits of the experiment.

- 5 McQuitty, L.L., Wrigley, C., & Gaier, E.L. An approach to isolating dimensions of job success. October 1954. (AFPTRC-TR-54-49) (Project 7700, Task 77016; Contract AF 33(038) 25726, University of Illinois). A study aimed at better identification of factors underlying job proficiency is reported. Descriptions of "best" and "poorest" airplane and engine mechanics were obtained from their supervisors, and a compendium of these descriptions suggests that there are many rather independent dimensions of behavior involved, and that the supervisors emphasized attitudes more than job knowledge when describing men who differ widely in proficiency.
- 6 Mays, R.J. Relationships between length of acquaintance and nature of trait rated and agreement between raters. November 1954. (AFPTRC-TR-54-55) (Project 503-001-0007). Each member of 4 OCS classes rated himself and every other man in his flight on each of 35 personality traits. One class performed the ratings after 3 weeks of acquaintance, a second after 2½ months, a third after 5 months, and a fourth 5 months following graduation. Analysis indicated that reliable peer ratings are obtainable from members of OCS classes after 3 weeks of acquaintanceship and that a 5-month separation does not lower the reliability. Although descriptive traits are more reliably rated than interpretive traits, there is no difference in reliability between emotional and nonemotional traits or between traits involving social interaction and those which do not.
- 7 French, Elizabeth G. A method of content analysis for "word pictures." November 1954. (AFPTRC-TR-54-56) (Project 7704, Task 77093). This study describes a method of quantifying relatively unstructured qualitative evaluations. At the time, such qualitative evaluations were in use in the USAF Officer Candidate School and those of Class 51-D formed the basis of the study. Since that time these evaluations have been discontinued but the method described can be used for quantifying such material obtained in other situations.
- 8 Creager, J.A. & Detter, H.M. The relation between seat location and performance on two radio code tests using loudspeaker administration. November 1954. (AFPTRC-TR-54-64) (Project 7700, Task 77014). The concern of this report is the standardization of conditions necessary in the administration of 2 aural radio code tests, the Signal Corps Code Aptitude Test (SCCAT), and the Army Radio Code Test (ARC-1), given in a room of 107 seats and 2 loudspeakers. Data from 2507 basic airmen who took SCCAT and 2314 basic airmen who took ARC-1 revealed that the average performance of men in some seat locations was significantly superior to that of men in other locations. By taking seat-location effects into account, it was found that the validity would be increased only slightly for the SCCAT and not at all for the ARC-1. Seat locations may have negligible influence in the overall task of selection and classification, even though certain locations are demonstrably superior to others.
- 9 Creager, J.A. Comparative validation of two radio code tests when used with the Airman Classification Battery in selecting radio operator trainees. November 1954. (AFPTRC-TR-54-65) (Project 7700, Task 77014). The Signal Corps Code Aptitude Test (SCCAT), requiring the examinee to discriminate pairs of signals, and the Army Radio Code Test (ARC-1), testing his ability to recognize code signals after a brief lapse, are compared for their relative contributions to prediction of success in radio operator training. The findings confirmed earlier studies in showing that the addition of either aural code test to the noncode tests appreciably increased the validity of the selection composite. The difference in validity of the two aural code tests is small when used with the Airman Classification Battery. The higher reliability of the ARC-1 gives it an advantage over the SCCAT for selection purposes. Comparison of various composites of tests in the Airman Classification Battery and aural code tests showed that reliable and valid selection of radio operator trainees may be accomplished by a modified Radio Operator Aptitude Index in which a code aptitude test receives at least half the total weight and Verbal and numerical tests the remainder.

- 10 Friedman, G.M. & Ivens, F.C. Factor analysis of the Airman Classification Battery AC-1B, the USES General Aptitude Test Battery, experimental visualization and spatial tests, and psychomotor tests. December 1954. (AFPTRC-TR-54-67) (Project 7700). This factor analysis identifies the common factorial content of the Airman Classification Battery, the U.S. Employment Service General Aptitude Test Battery (USES GATB), the psychomotor tests of the Aircrew Classification Battery, and Air Force experimental spatial relations tests and paper-and-pencil tests of psychomotor abilities. Using Thurstone's centroid method and the Zimmerman graphical rotations procedure, 9 orthogonal factors were extracted. The Airman Classification Battery has significant loadings on mechanical experience, numerical facility, verbal comprehension, and perceptual speed factors. The experimental psychomotor tests and comparable USES paper-and-pencil tests are good measures of the psychomotor speed factor. The Airman Classification Battery does not reflect the "psychomotor speed" factor, nor the psychomotor coordination and precision factors which are found in the Aircrew Classification Battery and USES psychomotor tests.
- 11 Tucker, J.A., Jr. Use of previous flying experience as a predictor variable. December 1954. (AFPTRC-TR-54-71) (Project 7701). 2 methods of adding previous flying experience to a composite are considered: (a) the wartime method of augmenting the predictor score by an additive constant or a constant multiplier; and (b) assignment of arbitrary score values to flying-experience categories to use directly in the multiple regression process. Each was applied to validation data for 2 pilot training classes in combining the previous-flying-experience variable with selected aircrew classification variables. The multiple regression technique produced higher validity coefficients with less shrinkage in cross validation than the technique of augmenting a predictor score.
- 12 Henry, K.R. & Ward, J.H., Jr. A general-purpose card-programmed control panel for the IBM Type 602-A Calculating Punch. December 1954. (AFPTRC-TR-54-72) (Project 7702, Task 77053). The function of the panel is to program 4 basic arithmetical operations such that A can be operated on by B to give C. The particular operation to be performed is designated by an operation code punched in a card. The elements A and B may be taken from any of 5 storage units or from a card. The result C may be placed in storage or punched in a card. In addition, the panel permits alternate operations to be performed dependent on the results of a balance test.
- 13 Pickrel, E.W. The relative predictive efficiency of three methods of utilizing scores from biographical inventories. December 1954. (AFPTRC-TR-54-73) (Project 503-001-0015). Items from the Biographical Inventory of the Airman Classification Battery were selected by 3 methods for prediction of final school grade in Air Force technical schools. 2 of the methods involve grouping items in clusters of high within-cluster correlations, one using a multiple regression technique and the other a unique pattern technique. The third method involves keying items which are related to the criterion whether or not the items form a psychologically and statistically meaningful pattern. In general, the method using the multiple regression technique was most efficient.
- 14 Friedman, G.M. & Detter, H.M. Factor analyses of Airman Classification Battery AC-1A and selected Air Force and civilian tests from the 1949 Normative Survey. December 1954. (AFPTRC-TR-54-75) (Project 7700). This paper compares the common factorial content of the test of the Airman Classification Battery with 4 civilian tests. In 3 analyses 10 factors were obtained of which 7 were common to all analyses and 1 was specific to each analysis. The factors of verbal comprehension, mechanical experience, numerical facility, perceptual speed, and academic information were best defined by the tests of the Airman Classification Battery. The factors of general reasoning and visualization were best defined by Part II and VI of the Guilford-Zimmerman Aptitude Survey, although the Airman Classification Battery had moderate loadings on these factors. The Battery did not have significant loadings on the factors of inductive reasoning, judgment, and fluency of expression.

- 15 **McReynolds, Jane. Administration of the Aviation-Cadet Officer-Candidate Qualifying Test under operational versus part-timed conditions. December 1954. (AFPTRC-TR-54-78) (Project 7701).** Scores achieved by new airmen with a specific time limit for each section of the test are compared with those of new airmen taking the test under the operational administrative procedure which does not involve the use of specific time limits. The groups, equated on all variables of the Airman Classification Battery, took the test in 2 sessions; the actual testing time for both groups was the same. There were significant differences between groups for 6 of the 13 subtests with all differences in favor of the group given specific time limits.
- 16 **Tomlinson, Helen. Development of short alternatives for a valid classification test. December 1954. (AFPTRC-TR-54-80) (Project 7700, Task 77008).** Two 4-part chart-reading tests and two 3-part dial-reading tests were studied for the efficiency with which they predicted scores obtained on the Dial and Table Reading test. Predictions from combination of 2 or 3 chart-reading subtests were better than those obtained from the dial-reading tests and were almost as efficient as were all 8 parts of the 2 chart-reading tests. Sets of 2 or 3 chart-reading subtests, requiring 2 minutes of testing time for each subtest are equivalent in predictive power to the Dial and Table Reading test.
- 17 **Pickrel, E.W. Prediction of the trainability of "slow learners" from tests with a symbolic and nonsymbolic content. December 1954. (AFPTRC-TR-54-82) (Project 7703, Task 77078).** The study tests the assumption that problem-solving tests of general ability in which the material is presented by means of pictures are more effective in predicting the trainability of limited-aptitude airmen than are problem-solving tests in which the material is presented in words. A concrete form and a symbolic form for each of 2 problem-solving tests were administered to 213 limited-aptitude airmen. They then received training in 2 clerical and 2 mechanical tasks and were scored for proficiency on each task. Correlation of test scores with proficiency measures showed the 2 forms equally predictive of trainability of limited-aptitude airmen.
- 18 **Anderson, G.V., Fruchter, B., Manuel, H.T., et al. Survey of research on spatial factors. December 1954. (AFPTRC-TR-54-84) (Project 503-002-0001, Contract AF 33(038)-11046, University of Texas).** This report outlines the progress of research directed toward description of spatial abilities through factorial analysis of aptitude tests. It reviews the current status of findings and points to problems that require further investigation. Emphasis is on implications for development of personnel selection techniques. From a consideration of the findings of 57 spatial tests, 3 spatial factors are defined: spatial rotation, spatial manipulation, and spatial orientation. A fourth factor is tentatively identified as the kinesthetic factor. Bibliography.
- 19 **Ward, J.H., Jr. An application of linear and curvilinear joint functional regression in psychological prediction. December 1954. (AFPTRC-TR-54-86) (Project 503-001-0015).** This study concerns methods of combining test scores for predictive purposes when it is known that the scores function jointly. 3 equations assuming various types of joint functional relations are applied to a problem of psychological prediction. The usual multiple regression equation and these 3 are fitted to 436 graduates of a radio operator course to determine regression weights and validities, and then are used to predict course grades for a second sample of graduates. Although the parabolic joint functional equation produced a best fit for the first sample, the equations lost validity on cross validation in proportion to their complexity.
- 20 **Taylor, M.V., Jr. & Peterson, R.O. The development of aircrew job element aptitude tests. December 1954. (AFPTRC-TR-54-88) (Project 7701, Task 77025; Contract AF 18(600)15, American Institute for Research).** An analysis was designed to improve classification of airmen into aircrew specialties. The first phase was concerned with development of a job-analysis procedure based on the critical incident technique. In the second phase 19 job elements involving attitudes and temperament were isolated. These were reduced to 16 which could be measured by paper-and-pencil tests. This study reports the development of aptitude tests to identify the individuals possessing them.

- 21 **Torrance, E.P.** The development of a preliminary life experience inventory for the study of fighter interceptor pilot combat effectiveness. December 1954. (AFPTRC-TR-54-89) (Project 7680). A biographical inventory was developed to identify potential fighter pilots. Scores of 31 Korean-experienced jet aces were compared with those of 31 nonaces matched for rank, age, and World War II pilot experience. 12 trait scales and 2 general scales differentiated fighter interceptor pilots from multi-engine pilots and aces from nonaces. Relationships between the Ace Scale and hypothesized characteristics were significant in the expected directions.
- 22 **Travers, R.M.W.** An inquiry into the problem of predicting achievement. December 1954. (AFPTRC-TR-54-93) (Project 7703, Task 77070). This paper provides a framework for the development of research on aptitudes and integrates some of the findings of research within this area with outcomes of research in learning and training. Such a framework is needed for studies of aptitudes to constitute a program rather than a series of separate investigations. The theoretical structure outlined is necessarily very tentative. Its function is to generate a series of hypotheses, each one of which can form the basis of a research project. As such projects are completed, this framework will change to conform with newly established facts and generalizations.
- 23 **Neuhaus, J.O. & Wrigley, C.** The quartimax method: An analytic approach to orthogonal simple structure. December 1954. (AFPTRC-TR-54-105) (Project 7702, Task 77054; Contract AF 33(038)25726, University of Illinois). An analytic procedure is presented for the orthogonal rotation of axes in factor analysis. The aim of rotation is to decrease the complexity of the factorial description of the tests. This results from finding the rotation which maximizes the variance of the squared factor loadings. The method is entirely objective and adapted to machine computation. Numerical examples and computational worksheets are included.
- 24 **Creager, J.A.** Some relations among linear composites, multiple regression, and factor analysis useful in estimating unknown correlations. December 1954. (AFPTRC-TR-54-107) (Project 7702). A technical review is presented of relationships among descriptive statistics of linear composites, multiple regression, and factor analysis. Some of these relations, usually presented for a special case, are generalized and clarified by the use of a uniform notation. The discussion emphasizes estimation of unknown correlations, such as criterion intercorrelations, which are necessary to objective formation of job families.
- 25 **Berkeley, M.H.** A method for developing equivalent forms of tests of complex functions. December 1954. (AFPTRC-TR-54-112) (Project 7704, Task 77094). A proposed method for developing comparable forms of a test composed of heterogeneous items is presented. The technique is a modification of a method for maximizing test saturation. With the proposed technique, two 14-item tests were developed from an Air Force attitude survey. Equivalence was tested on independent samples, and the 2 forms yielded equal means, variances, and covariances with 2 external measures.
- 26 **Yarnold, J.K. & Berkeley, M.H.** An analysis of the Cattell-Luborsky Humor Test into homogeneous scales. December 1954. (AFPTRC-TR-54-114) (Project 503-001-0007). Reactions of individuals to various types of humor might be usable as personality measurements if responses can be classified and scaled. Applying a method of analysis to identify homogeneous items of the Cattell-Luborsky Humor Test, the homogeneous categories prove statistically superior to scales previously derived for these items.
- 27 **Loevinger, Jane.** The attenuation paradox in test theory. Psychol. Bull., 1954, 51, 493-504. (AFPTRC-TR-54-121, December 1954) (Project 7702; Contract AF 18(600)370, Washington University). Classical test theory leads, under certain unusual circumstances, to the paradox that increasing the test's reliability decreases its validity. Literature concerning the "region of paradox" is reviewed. Consequences of these findings for practical problems of test

construction are suggested. The same facts which show that pursuit of reliability leads to lower validity under unusual circumstances show that pursuit of "scalability" leads to lower validity under ordinary circumstances. Thus consideration of the "attenuation paradox" leads to a more adverse judgment of "scale analysis" than of reliability theory.

- 28 **Gordon, Mary Agnes. Tables for predicting success from stanines. December 1954. (AFPTRC-TR-54-124) (Project 7702).** These tables are used in constructing expectancy charts to show the expected success of trainees at different aptitude levels. They were developed by assuming successive magnitudes of correlation coefficients between a predictor stanine and course grades. The tables are based upon the assumption of sample occurrences in accordance with the distribution of stanines in the airman population. If career guidance and cut-off scores have been provided for a sample which is to be referred to these tables, a correction formula is required for restriction of range. These tables are useful in overall evaluation of testing programs.
- 29 **Flyer, E.S. & Bigbee, L.R. The light plane as a Pre-Primary selection and training device: III. Analysis of selection data. December 1954. (AFPTRC-TR-54-125) (Project 7701, Task 77023).** An experimental evaluation of light plane training was undertaken using cadets in pilot training. The purpose was to ascertain whether light plane training provides better data on which to base prediction of success or failure in subsequent flying training. Results indicate that performance data collected during light plane training predicted Primary and Basic flight performance criteria. The Pilot Stanine in combination with light plane measures resulted in more accurate prediction of success during later phases of pilot training than did either type of measure alone.
- 30 **Friedmann, G.M., Hempel, W.E., Jr. & Detter, H.M. Comparative factor analyses of three radio operator training criteria. January 1955. (AFPTRC-TN-55-2) (Project 7700, Task 77014).** 3 analyses were performed on 3 groups of students who attended the Radio Operator school in the period 1949 to 1952. The criterion of success was a weighted final grade for the first group, pass-fail in the course for the second group, and pass-fail for the code-learning phase of the course for the third group. Since the code-learning phase occupies the first quarter of the course, the analyses yield some information on the composition of the total pass-fail criterion. Besides indicating that half the variance in the code-learning phase is represented by an aural factor, the analyses suggest that the criterion of success in the school changes as the course progresses. Visual and numerical abilities measured by the unaugmented Airman Classification Battery assume importance in the prediction of final grades.
- 31 **Thistlethwaite, D.L., Moltz, H., Kamenetzky, J., et al. Effects of basic training on the attitudes of airmen. June 1955. (AFPTRC-TN-55-3) (Project 7705; Contract AF 33(038)25726, Task F., University of Illinois).** Measurements were obtained of the attitudes of over 900 airmen at the beginning and end of the basic training program. In addition, information was obtained on the intelligence, education, experience, and attitudes of the tactical instructor assigned to each of the selected flights. Results indicate an overall improvement in personal adjustment, in favorableness of attitude toward combat and authoritarian leadership, and in motivation to serve. There was an overall decrease in expressed loyalty toward the flight and in regard for the tactical instructor's competence. Characteristics of tactical instructors most highly related to attitude change were the estimated severity of the instructor in enforcing discipline and his attitude toward training objectives. Flights with tactical instructors rated "permissive" tend to exhibit greater increments in motivation to serve than flights having instructors rated "strict." Airmen high in intellectual ability tend to show greater improvement in personal adjustment than airmen of lower intellectual ability.

- 32 **Gordon, Mary Agnes. Influence of background factors upon prediction of success in Air Force training schools: A review of the literature. June 1955. (AFPTRC-TN-55-4) (Project 7703, Task 77072).** Studies reviewed include: the effects of previous learning experience on subsequent learning behavior; the influence of community characteristics on aptitude scores and on criteria of academic success; the influence of the socioeconomic status of the family and home on predictor and criterion variables; the influence of specific background factors on specific aptitudes and the influence of various background factors on racial differences. Review of the literature chiefly serves to point up the differences in the conditions of public school and Air Force training and the differences which may affect the grades used as criteria. Conflicting answers were found to the question of whether early educational and cultural advantages are associated with better than predicted academic success.
- 33 **Smith, R.G., Jr. & Staudohar, F.T. Critical requirements of basic training tactical instructors. June 1955. (AFPTRC-TN-55-5) (Project 7705).** The proficiency of the basic training tactical instructor has an important effect on the training of new airmen in military skills and information. This report analyzes 6615 examples of especially effective or especially ineffective behavior of tactical instructors (critical incidents). The examples were reported by basic airmen, tactical instructors, and training supervisors. Effective incidents were reported much more frequently than ineffective in certain areas, such as those dealing with the tactical instructor's use of instructional methods and his use of punishment and rewards. Problem areas identified by a predominance of ineffective incidents are: lack of adequate care in the selection of trainee leaders, inappropriate language, threats, and loss of temper.
- 34 **Tomlinson, Helen. Development of short alternatives of factor-reference tests for five primary aptitudes. June 1955. (AFPTRC-TN-55-6) (Project 7703, Task 77082).** This report proposes a technique for accumulating information on trait measurement in a form directly applicable in developing new aptitude tests. The full-length, highly reliable factor tests are to be severely shortened and simplified to form an omnibus factor-reference test. A trial of the technique on a small group of reference tests demonstrated that the shortened alternatives are as effective as the full-length tests in identifying a single factor.
- 35 **Wheeler, R.E. & Schmid, J., Jr. Synthesis of procedures for the computation of various characteristics of simultaneous equations. June 1955. (AFPTRC-TN-55-9) (Project 7702).** This report is a synthesis of various methods for the computation of determinants, multiple correlations, beta coefficients, inverses (or any specific element of an inverse), standard errors of beta coefficients, the elimination of variables from previously computed inverses and sets of beta coefficients, and determinants and inverses for non-symmetrical matrices.
- 36 **Gragg, D.B., Kieselbach, D.J., Murphy, W.F., et al. The 14-week exploratory study of marginal-airman basic training: Comparison of proficiency of 8-week and 14-week training groups. June 1955. (AFPTRC-TN-55-10) (Project 7700, Task 77003).** The study compares the effectiveness of 2 training programs for low ability airmen which differed only in the length of the training time. The group to receive the experimental 14-week course was matched with that receiving the regular 8-week training on 8 variables. The performance of the 2 groups was measured at the end of their programs by the regular subject-matter tests and by tests administered primarily for this. 2 measures of mathematics showed superiority for the longer training period; on certain other measures a difference in favor of the longer training period was statistically significant but not large enough to have practical importance. There was no significant difference in language arts, even though a major training effort was made in that area. This study showed little gain from an extension of the basic training period for low-level airmen.



- 37 Morsh, J.E., Burgess, G.G., & Smith, P.N. Student achievement as a measure of instructor effectiveness. June 1955. (AFPTRC-TN-55-12) (Project 7950, Task 77243). Effectiveness of instructors was measured by the actual subject-matter achievement of an instructor's students. The Hydraulics Phase of the Aircraft Mechanics Course permitted each instructor to teach 2 classes a month apart, which allowed the gains of his first class to be compared with gains of his second class. On the basis of a pretest and of grades that students achieved in 3 previous phases, the scores students would make on a hydraulics posttest were predicted. An index of instructor effectiveness was determined in terms of whether or not his classes exceeded expectation. Other criteria of instructor effectiveness included forced-choice ratings and rankings by supervisors, rankings by fellow instructors, and student ratings. Results show that student gains can be reliably measured. Students' ratings of their instructors' teaching effectiveness and supervisors' ratings of instructors' verbal facility are correlated significantly with student gains.
- 38 Gordon, Mary Agnes. Implications of regional differences in aptitude for personnel classification. June 1955. (AFPTRC-TN-55-13) (Project 503-001-0001). In this study it was found that white males recruited from the southwestern and southeastern states made better grades in Air Force training schools than those with equal aptitudes scores from northeastern states. If differences are attributable to the influence of differences in cultural backgrounds on test scores, then it can be concluded from the data of this study that the observed grade was better than the predicted grade (a) in areas with an initial cultural disadvantage on the aptitude test, (b) in areas where scores on nonverbal tests were relatively better than scores on tests of specific knowledge of mechanical tools. This study suggests that there are variables which have been neglected in predicting success in technical training in Air Force schools.
- 39 Tupes, E.C. & Borg, W.R. Evaluation of a selection composite for screening applicants for USAF Officer Candidate School. July 1955. (AFPTRC-TN-55-15) (Project 7701, Task 77043). Procedures for screening and selecting applicants for USAF Officer Candidate School (OCS) were modified early in 1952. The new composite score consisted of an officer quality score derived from the Aviation Cadet Qualifying Test (ACQT), a score based on a board interview, and other scores awarded for years of college completed, airman technical schools completed, airman rank, and length of service, weighted according to their presumed importance to success in OCS and to later officer performance. Scores on the composite and its components were obtained for OCS Class 53-B. Biserial correlations between these scores and the criterion of graduation did not differ significantly from zero. Only the ACQT officer quality score was significantly related to academic grades. 4 variables were significantly related to military grades (service, rank, and interview positively, and college negatively). Further analysis suggested that modified weighting of the components could improve the prediction of academic grades or of military grades, but that no one set of weights would give an optimal prediction of both criteria.
- 40 Tupes, E.C. Comparison of performance in USAF Officer Candidate School of candidates selected by two screening procedures. July 1955. (AFPTRC-TN-55-16) (Project 7701, Task 77043). Selection procedures for OCS were changed early in 1952, and this report compares results of selection by the revised procedures with selection by those previously used. The existence of a backlog of applicants who had been accepted under the old procedures made it possible to study an OCS class containing reasonably large samples of candidates selected by both methods. The two crucial changes, were elimination of college credit requirements and removal of the subjective ratings by past military supervisors. The general effect was to render the bases of officer candidate selection more objective, placing a floor under general aptitude requirements and improving the estimation of past military accomplishments. A

greater percentage of the group selected under the new procedures graduated from OCS, and a significantly higher percentage ranked high in the class. Failures for military deficiency were in the same proportion for both groups, but the new selection procedures resulted in higher academic success.

- 41 Cox, J.A., Jr. The development and validation of MDAP English Proficiency Examination Form A. July 1955. (AFPTRC-TN-55-17) (Project 7701, Task 77027). Foreign nationals attend U.S. Air Force Pilot training schools under the Mutual Defense Assistance Program (MDAP). The MDAP English Proficiency Examination is used overseas to select personnel who understand English well enough to profit from this instruction. This report describes the development and the validation of the first form of this test. Form A was administered overseas in 1953 to select personnel to attend USAF pilot training schools. Another sample was tested in the U.S. Analysis of these data gave evidence of acceptable reliability of the test's part scores as well as its discriminating powers. An individually-administered behavior test of English comprehension was developed as a criterion of English proficiency. High correlation of the English Proficiency Examination with the behavior test and with an English test used in Pre-Flight training gave assurance that it actually measures language comprehension. Predictive validity was found for Form A through correlating the test scores with success in Pre-Flight training.
- 42 Tupes, E.C., Bowles, J.W., & Torr, D.V. Predicting motivation for flying training among senior AFROTC cadets. July 1955. (AFPTRC-TN-55-18) (Project 503-002-0007). Students in several universities were given a battery consisting of aptitude, attitude, and biographical information measures, together with AFROTC proficiency measures and confidential statements of intention to apply for later flying training. These expressed intentions were then compared with actual application for flight training. The test battery and the attitude scores were also correlated with registration for flying training. The results of the study indicated that the aptitude tests, biographical information scores, and the AFROTC proficiency measures were not related to application for flight training, but that positive relationships existed between favorableness of military attitude and motivation for flying. A positive relationship existed between stated intention to apply for flying after graduation and actual application. Whether cadets who applied for flying training did so partly because their military attitude was favorable, or whether their military attitude was favorable as a result of their having made up their minds to apply for flying training is unknown.
- 43 Thorndike, R.L. & Hagen, Elizabeth P. Identification of job skills in Air Force recruits. August 1955. (AFPTRC-TN-55-19) (Project 7700, Task 77015; Contract AF 33(038)13474, Teachers College, Columbia University). A printed questionnaire was developed to select potential "By-Passed Specialists" prior to the career-counseling interview. This Experience Record has 150 items covering activities relating to 33 Air Force Specialty Codes (AFSCs). The airmen report on a 5-point scale their familiarity with each of the specific job activities involved in the questions. Indications of experience are verified by an Air Force Job Knowledge Test (AFJKT). Data from several administrations of the Experience Record indicate that about a third of the men report experience which justified giving them an AFJKT, and that some 40 per cent of those so identified will "pass" the AFJKT at the minimum level required to qualify for an AFSC.
- 44 Smith, R.G., Jr. & Gragg, D.B. Quality control procedures for monitoring psychological testing. August 1955. (AFPTRC-TN-55-21) (Project 7700, Task 77005; and Project 7701, Task 77032). This report describes simple procedures which will rapidly detect discrepancies in test administration and processing. These procedures are applications to the test-monitoring problem of industrial quality control methods. The use of sequential analysis enables decisions to be made in a more economical fashion than by older more conventional procedures. After the

necessary tables have been prepared, the actual monitoring operation involves only a simple clerical routine. The procedures described are applicable to any continuing, large-scale testing program.

- 45     **Berkeley, M.H.** Comparison of supervisor, co-worker, and self-ratings of WAF job performance. September 1955. (AFPTRC-TN-55-25) (Project 7705, Task 77113). This report describes one phase of a study of attitudes, job satisfaction, and job performance among enlisted WAF personnel. A brief job-rating survey form that includes 8 major areas of job performance was used for self-ratings and for ratings by supervisors and co-workers. Data were gathered at 20 air bases in 7 major commands. One phase of the analysis compared the average ratings assigned by 4 groups: male supervisors, female supervisors, male co-workers, and female co-workers. There were no important differences among these 4 groups in mean ratings they assigned. From the intercorrelations among the 8 items, computed separately for each set of ratings, homogeneous scales were developed. The ratings by supervisors and by co-workers each resulted in a single scale of 7 items, with the same item dropped from both scales.
- 46     **Travers, R.M.W., Marron, J.E. & Post, A.J.** Some conditions affecting quality, consistency, and predictability of performance in solving complex problems. September 1955. (AFPTRC-TN-55-27) (Project 7703, Task 77071 and 77073). This report deals with differences among Air Force personnel in their ability to solve the complex administrative problems that confront those in positions of leadership. 4 administrative-type problems were developed in which the quality of the solution could be reliably scored. When they were first administered without any attempt to introduce incentives, only small relationships were observed between performance on one problem and performance on another. Consistency and predictability of performance were increased under conditions related to high motivation, but there was evidence that the problems draw upon somewhat different abilities. In an investigation of the consequences of the fact that complex administrative problems do not provide immediate feedback concerning the effectiveness of the solution produced, some evidence was found that the quality of the solution is likely to be in part a function of how long the problem solver persists in seeking improvements in his tentative solution.
- 47     **Shanley, D.C. & Smith, R.G., Jr.** An evaluation of the language arts aspect of the basic training program. November 1955. (AFPTRC-TN-55-36) (Project 7705). This study is an evaluation of one procedure that was used for the remedial training of airmen who were in Category IV of the Armed Forces Qualification Test (AFQT). This Language Arts Program provided training in reading, writing, and spelling, using military subject matter as a vehicle for the language training. Results indicate that the Language Arts Program was effective in improving the degree of comprehension of written material. Some trainees improved more than others, which suggests the use of low-level training programs as criteria for tests designed to separate those with a mental deficit from those with an educational deficit. The results found here apply only to a group with a fairly wide range of ability. The Category IV designation includes airmen between the 10th and 30th percentile on the AFQT. Other research with a lower level group and with a more extensive literacy program has yielded negative results.
- 48     **Moltz, H. & Thistlethwaite, D.L.** Attitude modification and anxiety reduction. *J. abnorm. soc. Psychol.*, 1955, 50, 231-237. (AFPTRC-TN-55-37, November 1955) (Project 7705, Task 77115; Contract AF 33(038)25726, University of Illinois). It was assumed that the process of attitude formation and attitude change, which are of primary concern in indoctrination courses, may overlap considerably with the processes involved in less complex learning tasks. The major hypothesis tested was that communication procedures which successively evoke and reduce anxiety will produce superior learning and increased susceptibility to attitude change.

500 newly inducted airmen in the basic military training course served as subjects in a communications experiment which attempted to modify the attitudes of airmen with respect to proper dental hygiene practices. It was found that greater anxiety reduction was not associated with greater learning, nor was it associated with greater reported conformity to the speaker's recommendations.

- 49 Thistlethwaite, D.L., de Haan, H., & Kamenetzky, J. The effects of "directive" and "nondirective" communication procedures on attitudes. *J. abnorm. soc. Psychol.*, 1955, 51, 107-113. (AFPTRC-TN-55-39, November 1955) (Project 7705, Task 77115; Contract AF 33(038)25726, University of Illinois). The primary purpose of the present research is to discover more effective methods of presenting communications in the basic military indoctrination of airmen. This report describes an experiment on the relative effectiveness of different communication procedures in modifying attitudes. Comprehension of the communicator's intended conclusion was increased when the speaker explicitly stated the conclusion, and when the facts and arguments were presented in a well-defined organizational context. Supplementary statements designed to aid the listener in integrating the facts and arguments presented by the speaker did not increase the speaker's persuasiveness. These findings indicate that better comprehension of the main point of a communication does not necessarily imply greater acceptance of the speaker's recommendations.
- 50 Bowles, J.W. & Torr, D.V. An attitude survey of AFROTC cadets. November 1955. (AFPTRC-TN-55-40) (Project 7701, Task 77040). The survey revealed that AFROTC units differed significantly in the frequency with which their members stated an intention to volunteer for flying training. Differences appeared in the frequency with which freshmen, sophomores, juniors, and seniors indicated intention to accept flying training. The data indicated that favorable attitudes toward a military career and toward flying may be organized quite early, perhaps even before the cadet enters the AFROTC program. A large proportion of the cadets did not believe that they could pass the flight physical examination. Other evidence indicated that AFROTC cadets can appraise their physical qualifications with considerable accuracy. Screening methods have been adopted employing a flight physical and attitude measures, in addition to aptitude screening devices to eliminate cases most unlikely to succeed in flying training.
- 51 Tupes, E.C. Development of a test battery for joint selection of AFROTC and AROTC cadets. November 1955. (AFPTRC-TN-55-41) (Project 7701, Task 77044). A joint Air Force-Army research study, designed to provide a valid test battery of leadership ability suitable for the screening of applicants for ROTC scholarships, was undertaken. An experimental battery of 13 predictor instruments was administered to nearly 2300 senior (Class of 1953) AFROTC and AROTC cadets at 6 colleges and data on 2 criterion measures (leadership ability, military science grades) were obtained. The cross validity of the entire experimental battery was sufficiently high for the prediction of leadership (about .25) so that efficient screening could result. An unweighted combination of 2 tests (Aerial Orientation, Senior ROTC Personnel Inventory) would be only slightly less valid than the entire experimental battery. This would provide a short selection battery easily administered to groups of applicants, and easily scored. With a standardized rating scale and 10 to 20 raters per subject, even untrained raters were able to make ratings which, when averaged, had a high reliability. Ratings of leadership ability are moderately predictable from test scores.
- 52 Cross, K. Patricia & Gaier, E.L. Technique in problem-solving as a predictor of educational achievement. *J. educ. Psychol.*, 1955, 46, 193-206. (AFPTRC-TN-55-46, November 1955) (Project 7700, Task 77016; Contract AF 33(038)25726, Task A, University of Illinois). The Balance Problems Test is an attempt to measure the extent to which individuals select and make effective use of principles as opposed to factual information in problem solving.

6 sets of problems, containing 4 problems each, were constructed. Problems could be solved either through the application of one general principle applying to the entire set or through the use of successive, discrete facts. The BPT was administered to 39 high school students for whom indices of educational achievement and of general aptitude were available. By means of correlational analysis, the following conclusions were reached: (a) Those who took more mathematics courses in high school made more use of principles in the BPT; they use fewer facts, even though the use of principles appeared to require more time. (b) While the use of facts was considered the easier method of solution, those who used facts were less likely to obtain the correct answer. (c) Performance on the BPT is a good predictor of mathematics grades. (d) Science test scores are positively correlated with the number of BPT problems correctly solved. They are negatively correlated with the use of BPT facts.

- 53      **Mason, H.M.** A comparative evaluation of two approaches to job-knowledge test construction. *J. appl. Psychol.*, 1954, 38, 384-389. (AFPTRC-TN-55-48, November 1955) (Project 7700, Task 77016; Contract AF 33(038)25726, University of Illinois). As part of a task on the development and evaluation of job-knowledge tests, 2 tests for mechanics were constructed, one centered about knowledge requirements for engaging in the job and the other oriented toward experience that might be picked up while performing it. When these Airplane and Engine Mechanics tests were tried out in several squadrons, tests focused on experience were found to give experienced mechanics an advantage over inexperienced ones. Tests centering around information failed to make this discrimination. Both kinds of tests gave the following order of merit for groups with heterogeneous experience: first, mechanics on the job; next, mechanic trainees; and last, inductees.
- 54      **Thistlethwaite, D.L. & Kamenetzky, J.** Attitude change through refutation and elaboration of audience counterarguments. *J. abnorm. soc. Psychol.*, 1955, 51, 3-12. (AFPTRC-TN-55-49, November 1955) (Project 7705, Task 77115; Contract AF 33(038)25726, Task F, University of Illinois). This study investigates the comparative effectiveness of alternative communication procedures in changing attitudes of 2 independent samples. One consisted of 756 basic airmen and 400 high school students. Some of the communications explicitly refuted arguments the audience might raise against the presented thesis. Other communications presented the same facts and arguments but no explicitly refutative statements. In addition, the experiment compared the effects of elaborating vs not elaborating the major arguments of opposed members of the audience. Among the high school students, the effects of presenting explicit refutations were to (a) increase audience comprehension of the speaker's conclusion, and (b) elicit greater discounting (unfavorable appraisal) of the communication. Refutative and nonrefutative procedures were equally effective in changing attitudes. Among the airmen, explicit refutations increased neither comprehension nor discounting. Nonrefutative communication procedures were more effective. The one-sided communications which did not elaborate opposed arguments tended to be more effective in changing attitudes.
- 55      **French, Elizabeth G.** Interrelation among some measures of rigidity under stress and nonstress conditions. *J. abnorm. soc. Psychol.*, 1955, 51, 114-118. (AFPTRC-TN-55-59, December 1955) (Project 7704, Task 77092). This study is a comparison of performance under two differently structured emotional climates. 7 tests of rigidity, measuring different aspects of the variable, and a test of achievement motivation were given to 50 male airmen under ego-involved conditions and to 50 under relaxed conditions. The results include: (a) ego-involved conditions did not produce an increase in rigid behavior; (b) there was no evidence of a general interrelation between the various measures of rigidity; (c) ego-involved conditions produced no increase in interrelation between measures of rigidity; and (d) achievement motivation did increase under ego-involved conditions.

- 56 **McQuitty, L.L.** A method of pattern analysis for isolating typological and dimensional constructs. (AFPTRC-TN-55-62, December 1955) (Project 7700, Task 77016; Contract AF 33(038)25726, Task A, University of Illinois). This paper develops and illustrates a method of analyzing patterns of responses, similarity analysis, which permits interpretation of them as indicative of a limited number of inferred characteristics. It postulates merely inferred characteristics which may be either typological or dimensional in nature. The technique is applied to Air Force mechanics for isolating the dimensions peculiar to various categories of subjects and for determining which dimension is appropriate for the evaluation of each mechanic. Similarity analysis gives an optimal solution; each pattern of responses is classified in that category which maximizes the relevancies of its responses to the category. The relevance of each response as an index of each inferred construct is quantitatively determined, and the constructs can be described in terms of the more relevant responses.
- 57 **Price, B.P. & Schatz, H.H.** Application of high-speed computation to factor analysis operations. December 1955. (AFPTRC-TN-55-64) (Project 7702, Task 77055; Contract AF 18(600)395, Southwest Research Institute). This report is concerned with programs for 5 different methods of factor analysis. These programs are general and can be made applicable to any of the various types of general purpose computers. Coding for input into the machine is the only additional step required before problems of this type can be solved with much greater accuracy in much less time than by other kinds of machine computation. These 2 advantages lead to a third, that of increasing the range of operations and the flexibility allowed the research worker when he must make a decision as to the kind of analysis he will employ for specific research problems.
- 58 **Price, B.P. & Schatz, H.H.** Application of high-speed computation to linear discriminant function operations. December 1955. (AFPTRC-TN-55-66) (Project 7702, Task 77055; Contract AF 18(600)395, Southwest Research Institute). The use of general purpose, digital computers involves 2 phases: (a) the programming phase, and (b) the coding and operation phase. This report concerns itself with the first phase of this problem. Ordinarily programs are general and can be coded for any specific machine, so that until a specific computer is selected to accomplish the computations, specific codes are not very practical. This report provides a general method for solving linear discriminant function problems through the aid of any of a variety of high-speed computers. The running time for the computations, after programming and coding have been accomplished, is such that solutions can be obtained for large problems quickly and economically.
- 59 **French, Elizabeth G.** Relation of an indirect measure of attitude to expressed military attitude. December 1955. (AFPTRC-TN-55-72) (Project 7704, Task 77099). In this study an objective indirect measure of attitude was developed and related to the direct measure currently in use. Some relationship was demonstrated between the 2 measures under conditions of experimental administration. In addition the indirect measure yielded similar distributions under experimental and operational conditions while the direct measure showed the expected higher mean and smaller variance under operational conditions.
- 60 **Bowles, J.W.** Preliminary analysis of the Thurstone Color-Form Dominance Test. November 1955. (AFPTRC-TR-55-1) (Project 7704, Task 77091). Development of valid selection and classification tests which tap the motivation and temperament aspects of personality has proved to be one of the most difficult test construction problems. The present report describes a preliminary analysis of an experimental device designed to measure motivation and temperament aspects of personality. The Thurstone Color-Form Dominance Test, as administered to 200 airmen, yielded 2 types of scores: one score reflected a tendency on the part of the subjects to perceive moving colors vs moving shapes; the other, a tendency to

see apparent movement as either upward or downward. Analysis indicated that color vs form scores were markedly affected by seating position and that test-retest reliability was low. The vertical movement score was more stable and less affected by the position from which the subject viewed the test material. As such, it is more amenable to group-administered investigation and may warrant further study.

- 61 French, Elizabeth G. & Ernest, R.R. The relation between authoritarianism and acceptance of military ideology. *J. Pers.*, 1955, 24, 181-191. (AFPTRC-TN-56-34, February 1956) (Project 7704, Task 77093). This study is concerned with evaluating 2 scales and other psychological material as means for assessing the acceptance of military ideology under varying conditions. The California F-Scale, some additional items of the same kind, a Military Ideology Scale, and a question about Air Force career intentions were administered to 186 basic airmen at the beginning of training and again 6 weeks later. Half the subjects signed their papers and half answered anonymously. The hypothesis that F-Scale responses would be related to acceptance of military ideology was confirmed. The relationship was greater when only F-Scale items dealing with attitudes toward authority, conventionalism, and "hard-headedness" were used. F-Scale responses were unchanged by military training. The combination of signed conditions and pressures of the first week of training produced higher F-Scale scores than the other conditions. The major findings were duplicated with an Officer Candidate School population.
- 62 French, Elizabeth G. Some characteristics of achievement motivation. *J. exp. Psychol.*, 1955, 50, 232-236. (AFPTRC-TN-56-37, February 1956) (Project 7704, Task 77101). This report suggests that typical level of achievement motivation is a significant variable affecting the degree to which a desired level of motivation can be aroused by introducing appropriate cues into the situation; that this resultant motivation can be independently measured; and that it is related to performance. The findings suggest that an independent measure of motivation and a knowledge of the characteristics of the stimulus situation are both essential for predicting performance. It is possible, to some extent, to identify in advance which individuals are more likely to increase output under varying sets of stimulus conditions.
- 63 Zaccaria, M.A., Dailey, J.T., Tupes, E.C., et al. Development of an interview procedure for USAF officer applicants. February 1956. (AFPTRC-TN-56-43) (Project 7701, Task 77022). An interview procedure and report form were developed suitable for all Air Force officer procurement programs wherein selection is based upon the findings of an interview board. The procedure is suitable for 3-man boards with little prior training, and is designed to furnish a reliable estimate of officer potential but not of technical proficiency or any other area which is better measured by test material or evaluation reports of past performance. 3 tryouts, 2 using cadets in the AFROTC training program as interviewees and the third using applicants for pilot training, were useful in revising the preliminary procedure and providing estimates of the reliability and validity of scores yielded by the procedure. The interview procedure yielded fairly reliable evaluations, but they were only slightly related to leadership ability. On the basis of these findings it is clear that: (a) the interview will not be useful in procurement programs where other kinds of measures of officer leadership potential are available, and (b) it should be used only as a screening instrument to eliminate the small percentage of applicants obviously lacking officer leadership potential.
- 64 French, Elizabeth G. Development of a measure of complex motivation. April 1956. (AFPTRC-TN-56-48) (Project 7704, Task 77101). The report describes the development of an independent measure of complex motivations for use in studies of the role of such motivations in performance. From a trial administration of 50 verbal stimulus items, which permitted but did not require achievement and affiliation responses, two parallel 10-item forms of the test

were constructed. Scoring categories were developed and refined until satisfactory inter-rater agreement was reached. Scores on early forms of the test were correlated with questionnaire items pertaining to behavior considered dependent in part on the motives studied. Presented to Preflight cadets as a Test of Insight, the test elicited achievement and affiliation oriented responses for which a reliable scoring system was developed. While motivation scores on preliminary forms were uncorrelated with observers' judgments of motivation and goal attainment, the judgments of both motives correlated (.82) with observed goal attainment. Test of Insight scores showed low (.19) but consistent and significant correlations with sentiment and questionnaire responses pertaining to achievement and affiliation.

- 65 **Morsh, J.F. Systematic observation of instructor behavior. May 1956. (AFPTRC-TN-56-52) (Project 7950, Task 77243).** From observation in technical school classroom situations, 3 short check lists were constructed. These forms were designed to facilitate the observing of instructor verbal behavior, instructor nonverbal behavior, and student behavior. After extensive tryout, 35 items were retained where (a) 2 or 3 airman observers agreed on the frequency of occurrence of the behavior, and (b) where an instructor's behavior tended to be consistent over time. 3 senior airman observers used the lists in conducting half-hour observations of 120 hydraulics instructors. 3 criteria, student gains, student ratings, and supervisor ratings, were correlated with each of the 35 instructor and student behavior items to find which items best predicted each criterion. Certain student behaviors were related to student achievement; certain instructor behavior items were related to supervisors' ratings. Items on the Instructor Verbal Behavior, Instructor Non-Verbal Behavior, and Student Behavior check lists were not significantly related to one another. Student learning of subject matter was predicted better from student behavior, especially inattentive behavior, than from instructor behavior in the classroom.
- 66 **Hausman, H.J. & Morsh, J.F. The aviation mechanic testing program in the operational commands. May 1956. (AFPTRC-TN-56-53) (Project 7950, Task 79500).** A method for determining where training is needed, and who needs training, was considered essential in providing information for planning a training program. Diagnostic testing instruments answer this purpose. The purpose of this report is to describe the development and use of some of these instruments. Principles guiding the development of a diagnostic instrument were: (a) Tests must reflect day-to-day job duties rather than broad general principles. (b) Separate diagnostic scores that reflect logically discrete areas of the job must be provided. (c) Broad coverage of duties is required so that a maximum of information can be given. (d) Standards of performance must be provided. (e) A simple procedure for interpreting test scores is necessary. Based on experience with interview-type examinations administered by highly skilled mechanics, 2 sets of objective, multiple-choice examinations were developed, the Written Evaluations of Mechanics' Proficiency (WEMPs) and Training Needs Tests (TNTs).
- 67 **Morsh, J.F. & Schmid, J., Jr. Supervisory judgment as a criterion of airman performance. May 1956. (AFPTRC-TN-56-56) (Project 7950, Task 79505).** The purpose of the present investigation was to see to what extent supervisors' ability to estimate their airman subordinates' job knowledge is related to supervisors' own job knowledge, rank, education, and attitude. Supervisors' attitude toward the Air Force was determined by a questionnaire completed by supervisors in 4 career fields. Airmen's attitude toward their supervisors was obtained from pertinent items of a Job Satisfaction Inventory. Supervisors and the men they supervised completed the Training Needs Test for their specialty to measure their proficiency on jobs of the career ladder. A "leniency of rating" score was obtained for each supervisor by subtracting scores his airmen obtained in each test from the scores as estimated by the supervisor. Results showed that: supervisors' estimates of airmen's test scores agreed to some extent with scores



airmen received; supervisors were more lenient with men they knew longer; the higher the supervisors' rank the more severe they were in rating the job knowledge of their men; supervisors' accuracy of rating increases with their knowledge of the job; supervisors' job knowledge is related to their education and to their rank; and supervisors' attitude toward the Air Force becomes more favorable with increase in rank.

- 68 Nolan, C.Y., Ratliff, F.R., & Richey, H.W. The Airmen's Proficiency School: An approach to the problem of adaptation and motivation in the Air Force. May 1956. (AFPTRC-TN-56-57) (Project 7950, Task 79507). This report deals with some effects of training designed to adapt and motivate airmen personnel. 3 attitude scales and a statement of reenlistment intent were administered to 895 airmen in 13 classes before and after training in the Airmen's Proficiency School. Changes in attitudes, class differences, and significant interactions were assessed by analysis of variance techniques. Attitudes of the airmen toward the school and its goals were generally favorable. Although results were not always consistent between classes, small but statistically significant gains were shown on the scales measuring Air Force ideology and feelings of security in the Air Force. Hypothesized changes in attitudes toward NCOs and reenlistment were not demonstrated.
- 69 Hagen, Elizabeth P. & Thorndike, R.L. Follow-up study of Air Force examinees. May 1956. (AFPTRC-TN-56-58) (Project 7701, Task 77038). Records of Air Force aptitude test scores have been accumulating for aircrew training applicants since 1942. If it is practicable to obtain information about civilian careers of large occupational groups of former aircrew applicants, it then becomes possible to determine the precision and stability of long-range prediction from aircrew classification tests. Starting with 9-year-old testing records of 1500 applicants, civilian addresses were located for 77%. Questionnaires were returned by 65% of them, or over 50% of the original rosters. Reported civilian occupations were distributed among 154 job categories, but only 25 categories had as many as 10 reporting. Profiles of test score averages for the larger groups indicate that in a full-scale survey the aptitude tests might show discriminations both between occupations and between the most and least successful groups within occupations. Feasibility of a large-scale survey has been demonstrated. This report provides information for determining size, design, and techniques of such a survey.
- 70 Hausman, H.J. & Goldberg, S.C. Nontechnical factors in the job performance of aircraft mechanics: Study II. May 1956. (AFPTRC-TN-56-59) (Project 7950, Task 79507). This study is an attempt to define with more precision some of the content in self and supervisors' ratings by looking beyond general factors. Supervisor ratings were secured from 20 crew chiefs and self-ratings from 85 mechanics. Assistant crew chiefs completed both rating forms. From factor analysis of the ratings, 5 relatively independent dimensions of self-rated attitudes toward the job were identified, but no general factor of "morale" was found. The supervisors' ratings of mechanics showed a bifactor structure. Each item rated by a supervisor contained a large component of halo and an appreciable component of a major trait apparently related to the verbal content of the item. The element of friction vs smoothness in his relations with a subordinate seemed to affect the supervisor's ratings for that subordinate on all traits, thus accounting for the halo effect. 4 factors in addition to the general factor were identified. Composite trait scores from supervisors' ratings were highly intercorrelated, but an underlying "things vs people" structure explained the relationship of rated traits, with a work-oriented traits cluster distinguished from a social elements cluster.
- 71 McReynolds, Jane. Development of motivation keys for the Armed Forces Qualification Test Forms 3 and 4. May 1956. (AFPTRC-TN-56-60) (Project 7700, Task 77000). Special scoring keys for the Armed Forces Qualification Test (AFQT) were required to assist in detecting those men who might be deliberately failing the mental qualification test to avoid

military service. 2 keys were developed for AFQT Forms 3 and 4. Key I was based on a comparison of the responses made by a group of marginal-ability airmen who were trying to pass the test with those made by a group of Category I, II, and III airmen who had been instructed to fail the test. Key II was based on a comparison of the marginal group with a group of Category IV men who were told to fail the test. Incorrect responses favored by the intentional failures were keyed. 2 independent samples, one of failing applicants and one of basic airmen were used for cross validation of the keys. On the basis of correlational analysis, Key I was preferred for both AFQT-3 and AFQT-4. Only 17% of the intentional failures for AFQT-3 fell in a doubtful classification and 22% for AFQT-4. It was less effective for the Examining Station sample, as 48% for AFQT-3 and 54% for AFQT-4 were in the doubtful classification.

- 72      **Davis, F.B. The construction of spatial orientation items by means of a cyclorama.** June 1956. (AFPTRC-TN-56-61) (Project 7701, Task 77046; Contract AF 18(600)388, Test Research Service). An accurate technique was required for simulating aerial photographs in constructing new forms of an aircrew selection test. A cyclorama was designed and constructed to represent the visual field of an observer in a Piper Cub at an altitude of 250 feet. Key points and lines in the terrain were projected on the walls of a cyclorama to guide the artist in making the perspective drawing. A special camera mount, scaled for precise angular adjustment, provided for rotary motion in 3 dimensions about the fixed point of the observer. 2 spatial orientation tests were constructed from cyclorama photographs. Statistical analysis shows that the new tests measure in large part the same functions as the previous test, but that they are more closely related to each other than to the old test. In developing personnel tests that require aerial views of terrain, photographing within a cyclorama is a practical compromise between direct photography and independent drawing.
- 73      **Norris, R.C. Development of an efficient set of dimensions for description of Air Force Ground-Crew jobs: Part I. Rating dimensions.** June 1956. (AFPTRC-TN-56-63) (Project 7700, Task 17000; Contract AF 33(038)13474, Teachers College, Columbia University). To identify the significant independent dimensions of Air Force enlisted jobs, 150 jobs were rated by 4 professional psychologists with respect to 170 attributes. A set of 130 attributes were chosen as meeting minimum standards for importance and reliability of rating. The intercorrelation matrix was factor analyzed by Thurstone's "diagonal" method to identify the common dimensions. Traits which were quite reliable but independent of the common dimensions were identified by multiple correlation techniques. 11 common factors and 7 additional attributes made a set of 18 dimensions which provide a framework for describing the requirements of Air Force enlisted jobs.
- 74      **Thistlethwaite, D.L., Kamenetzky, J., & Schmidt, H. Factors influencing attitude change through refutative communications.** Speech Monogr., 1956, 23, No. 1, 14-25. (AFPTRC-TN-56-64, June 1956) (Project 7705, Task 77115; Contract AF 33(038)25726, University of Illinois). The focus in these studies was the immediate reactions of the audience (college men) to tape-recorded speeches as revealed by a program analyzer. In the first study, 2 variables were studied: (a) explicitly refutative vs implicitly refutative communications; and (b) 1-sided vs 2-sided communications. In the second study, the variables were: (a) climax vs anticlimax order of presentation of explicit refutations; and (b) use of second-person vs use of third-person grammar in describing the source of the counterarguments refuted. Questionnaires were administered to determine opinions on relevant topics and tendency to discount the communication. In the first study, 2-sided presentations of refutations tended to arouse antagonism. While the communications as a whole proved persuasive, there were no differences in the effectiveness of the different types of communications in changing the opinions of opposed subjects.

- 75 DuBois, P.H., Loevinger, Jane, & Smith, T.L., Jr. Evaluation of methods of keying psychological tests for prediction of external criteria. With Appendix by Tucker, L.R., DuBois, P.H., & Smith, T.L., Jr. Scoring item punched cards by selector networks. June 1956. (AFPTRC-TN-56-65) (Project 7702, Task 77062; Contract AF 18(600)370, Washington University). The 4 objectives were: to develop tests by 4 methods of empirical selection from a pool of heterogeneous items; to develop tests by homogeneous clustering of the same pool of items; to compare the effectiveness of the tests in predicting an external criterion; and to devise computing techniques for handling large masses of item data by means of punched cards. All the experimental keys were developed on one sample of 1000 aircrew cadets and cross validated on the second sample. All 4 methods of empirical keying yielded about the same cross validities. Hence the simplest procedure, selection by highest correlation or covariance with the criterion, can be used. Validity of the tests constructed by these methods did not differ from the multiple correlation estimated from the 4 homogeneous keys. The machine procedures developed for analysis and scoring of items by selector networks double the item capacity of the IBM punched card.
- 76 Mason, H.M. A further study of experience-centered and requirements-centered tests of job knowledge. J. appl. Psychol., 1956, 40, 14-16. (AFPTRC-TN-56-66, June 1956) (Project 7700, Task 77016; Contract AF 33(038)25726, University of Illinois). A previous study investigated the relative merits of 2 approaches to constructing items that test knowledge gained through experience as an aircraft and engine mechanic. This study is a repetition of the first investigation in another setting. 2 experience-centered and 3 requirements-centered tests were developed from statements of technical knowledge requirements. Test validities were determined by comparing test means for mechanics from 3 levels; apprentice, senior mechanic, and supervisor-technician. Analysis of variance was used to determine the significance of relationships between test means and skill levels. 5 tests were significantly related to the criterion of level of job skill. One of the experience-centered tests, *Maintenance Facts*, had the highest validity. Observed differences favored the other experience-centered test over the requirements-centered tests. Results are in agreement with those of the previous study. Experience-centered job knowledge tests for aircraft and engine mechanics have greater validity than requirements-centered tests when the criteria are job skill levels.
- 77 Berkeley, M.H. & Brokaw, L.D. Stability of WAF attitudes as measured by WAF attitude survey BE-CE501GX. June 1956. (AFPTRC-TN-56-72) (Project 7705, Task 77113). To determine differences in WAF attitudes at 2 stages of Air Force service, a questionnaire survey was administered to 196 WAF in basic training and readministered to the same WAF as permanent party on several Air Force bases at a later date. The survey provides 16 scales which cover the following areas: motives for joining the Air Force, civilian and military attitudes toward WAF, personal status, reenlistment intentions, adequacy of training, housing, recreation, superior-subordinate relationships, and interpersonal relations. Significant shifts in attitude were found from the basic training to the on-the-job situations. The permanent party WAF is more concerned with the working and living aspects of the situation than she is with its strictly military components. She accepts the arbitrary structure of military authority and is not too distressed by the barracks life. She is less happy about her work situation, her job and the training she got for that job, and her educational and recreational opportunities.
- 78 Morsh, J.E. Development of the Written Evaluation of Mechanics' Proficiency (WEMP) measure for B-50 aircraft. June 1956. (AFPTRC-TN-56-75) (Project 7950, Task 79500; Contract AF 18(600)82, Personnel Research Institute, Western Reserve University). It was necessary to develop a measure for determining which B-50 mechanics need training and to identify those job areas in which a mechanic most needs training. For each WEMP, a test outline was set up, subject matter experts were selected and trained, items were constructed,

and experimental forms were tried out. From item analyses of difficulty and discrimination, a final form was constructed. From administration to appropriate groups of airmen, reliabilities, validities, and conversion tables were determined. Reliability of diagnostic areas ranged from .48 to .86, with the median reliability of differences .38. Area validities for supervisor ratings averaged around .35, and for mechanics' military grades around .60. Use of the test as a diagnostic measure to provide information for planning on-the-job training of B-50 mechanics appears warranted.

- 79 Bryant, N.D. A factor analysis of the Report of Officer Effectiveness (Form 77A). June 1956. (AFPTRC-TN-56-77) (Project 7701, Task 77042). This report presents an analysis of officer ratings on a detailed check list to determine the extent to which the ratings differentiate activity areas. The 54-item Air Force Form 77A was completed by 2 superiors for each of 411 male OCS graduates at the end of 6 months on-the-job training in a basic military training squadron. The 2 ratings on the 54 variables were pooled and intercorrelated. Factors were extracted by the centroid method. Graphic rotation to simple structure was unsatisfactory, and a multiple-group solution gave the basis for inferring dimensions of the rating form. A general factor accounted for most of the correlation among the 54 items. 5 group factors were tentatively defined by the relationships among separate clusters of the check list items interpreted as: I, conforming to the prescribed role of the responsible officer; II, proficiency in intellectual tasks; III, getting along with people; IV, proficiency in supervising personnel; and V, facility in communication. These concepts of aspects of an officer's job seem at least as defensible as the *a priori* categories of Form 77A.
- 80 Richey, H.W. & Ratliff, F.R. The prestige of Air Force career fields. June 1956. (AFPTRC-TN-56-78) (Project 7950, Task 79505). It was hypothesized (a) that prestige values are attached to Air Force career fields and that a career field prestige hierarchy can be reliably established, and (b) that the rank order of career fields on prestige by airman, NCO, and officer judges will be similar. 3 groups (50 airmen, 48 NCOs, and 50 company grade officers) rated 38 career fields on prestige. Reliabilities of the ratings were determined. Career field prestige rankings established by the 3 groups of raters were intercorrelated to compare agreement among the rater groups. Agreement was almost complete among the 3 groups regarding the prestige order of 38 career fields. Career fields with titles and duties implying professional and semi-professional status received the highest ratings. Intermediate ratings were given career fields engaged in skilled, clerical, and distribution functions. Those career fields concerned with semi-skilled and unskilled services stood low on prestige.
- 81 Mitra, S.K. & Fiske, D.W. Intra-individual variability as related to test score and item. Educ. psychol. Measmt., 1956, 16, 3-12. (AFPTRC-TN-56-80, June 1956) (Project 7704, Task 77090; Contract AF 18(600)601, University of Chicago). This paper is concerned with the difference between the 2 responses of an individual to the same test item at 2 points in time. An interests questionnaire and a self-rating adjective check list were administered to 118 air-crew cadets twice with a 10-week interval. Both tests had a test-retest reliability of at least .70. Variability scores and reliabilities (K-R 20) were computed for both test scores and item responses. For a set of relatively homogeneous items, there were reliable individual differences in variability. For a group of persons, the more homogeneous their responses to an item, the less variability for that item. For a set of items, the total test score was related to response variability; individuals with low scores tended to have high response variabilities, those with high scores tended to give the same response on both testings. The finding that some of a test's error variance is correlated with its reliable variance indicates that the usual estimates of a test's reliability need modification. The relationship between variability scores and scores on the inventories suggests that response variability is a measureable personality trait that may have significance for personnel selection and classification.

- 82 Osterweil, J. & Fiske, D.W. Intra-individual variability in sentence completion responses. *J. abnorm. soc. Psychol.*, 1956, 52, 195-199. (AFPTRC-TN-56-81, June 1956) (Project 7704, Task 77090; Contract AF 18(600)601, The University of Chicago). This study investigated the nature and amount of response changes on a projective test where responses are free rather than multiple choice; and explored relationships between variability and certain stimulus characteristics. The same test was given on 2 occasions to 4 groups (93 subjects) of college students. 2 Normal groups were given instructions which suggested that the study concerned group attitudes. The Good Adjustment group was instructed to create a favorable impression, the Bad Adjustment group an unfavorable impression. Judges classified responses into sets of similar or equivalent completions; and into Popular, Common, and Unique responses. Judges then classified the second response as similar to or different from the first response. Content of the majority of responses changed on retest, Unique responses were changed more frequently than Common or Popular responses, and persons who gave many unique responses had higher change scores than persons who gave few unique responses. These findings were true for all groups.
- 83 Staudohar, F.T. & Smith, R.G., Jr. The contribution of lecture supplements to the effectiveness of an attitudinal film. *J. appl. Psychol.*, 1956, 40, 109-111. (AFPTRC-TN-56-82, June 1956) (Project 7705). To determine the effect of brief lecture supplements on expressed attitudes toward discipline, 3 lectures were developed for use with the commercial motion picture *Twelve O'Clock High*. All stressed scenes in the film thought likely to produce favorable attitudes toward discipline in military service. 4 groups of basic airmen, served as subjects. One group was lectured prior to viewing the film; the second was lectured after the film; the third was given both an introduction and review; and the fourth was the control group which received no lecture. Attitudes toward discipline were measured by a brief questionnaire. Analysis of variance and differences between mean scores of the control and experimental groups showed that airmen who heard one of the lectures with the film expressed more favorable opinions concerning military discipline than those who had seen the movie without a lecture. None of the lectures was more effective than any other. Supplemental lectures provide a simple means for making more effective use of films which are already pertinent to a given attitude.
- 84 McReynolds, Jane. Mental qualification tests for women of the Armed Forces. June 1956. (AFPTRC-TN-56-87) (Project 7717, Task 87001). All services use the Armed Forces Qualification Test (AFQT) for screening enlisted personnel. Recent forms minimize verbal skills and maximize mechanical training or experience, and are designed to have the greatest precision of measurement around the low qualifying score used for male enlistees. These characteristics were inappropriate for female personnel and the Air Force was asked to develop a selection instrument for women. Because women in military service tend to be given clerical and administrative assignments, verbal and quantitative items were selected, on the basis of item analysis data, for 2 parallel forms of 100 items each. Shorter forms were developed for prescreening to help recruitment personnel select applicants likely to qualify on the longer tests. The Armed Forces Women's Selection Test, Forms 3 and 4, provides, in addition to a total score, a verbal score and a quantitative score which are reliable enough to be used separately.
- 85 Nolan, C.Y. Attitude differences among disparate Air Force specialties. June 1956. (AFPTRC-TN-56-88) (Project 7950, Task 79507). This paper reports a preliminary investigation of motivation to determine whether (a) skilled job groups with readily identifiable and lasting products have greater job satisfaction than those without such products; (b) individuals in jobs without such products, as compared with those in jobs with products, make higher

scores on measures of Air Force ideology; (c) individuals in jobs where incumbents are characterized by low intelligence and aptitudes will have a more favorable opinion of the economic opportunities of the Air Force and will desire closer supervision on the job than those in other groups. Groups of 52 airmen in the top 4 pay grades were selected from 5 career fields – Armament Systems Maintenance, Aircraft and Engine Maintenance, Food Service, Supply, and Administrative. Mean scores were derived from 8 short attitude scales (Affective Feeling Toward NCOs, Economic Opportunity in the Air Force, Feeling of Security in the Air Force, NCO Leadership, Air Force Ideology, Job Satisfaction, Amount of Supervision Desired on the Job, and Authoritarianism) and an expression of reenlistment intent. Differences among groups were found for reenlistment intention and for all except one (Affective Feeling Toward NCOs) of the attitude scales.

- 86 **Gragg, D.B. & Douglass, H.J. Conversion tables for selected Airman Classification Battery scores and comparable scores on other selected service and civilian tests. June 1956. (AFPTRC-TN-56-89) (Project 7700, Task 77004).** Tables are provided for converting scores in the General, Mechanical, and Clerical aptitude areas under which Air Force specialties may be assigned with reasonable accuracy. They may be used whenever there is a requirement for transforming scores on tests used by the Army or Air Force into equivalent scores in terms of tests used by the other service for classification, estimation of manpower pools, and standardizing new testing instruments.
- 87 **Travers, R.M.W. Personnel selection and classification research as a laboratory science. Educ. psychol. Measmt., 1956, 16, 195-208. (AFPTRC-TN-56-96, July 1956; ASTIA Document AD-098 872) (Project 7719, Task 17011).** This paper reviews some of the problems involved in predicting achievement from aptitude tests. Despite all the work in specific areas of predicting achievement, only small advances have been made in precision of predictions. Advances are represented by extension of the area in which predictions can be made rather than improved accuracy of prediction. One difficulty is that current validation procedures do not easily permit discovery of many variables which now limit accuracy. An approach is suggested through which laws of behavior can first be discovered under laboratory conditions and inferences from these laws be validated in field studies. A difficulty in this approach is that most criteria of proficiency in field conditions represent proficiency after extended learning, but laboratory criteria represent proficiency after only a limited period of learning.
- 88 **Buckner, D.N. Construction of a proficiency examination for maintenance personnel on a new weapon system. August 1956. (AFPTRC-TN-56-105, ASTIA Document AD-098 880) (Project 7950, Task 17075; Contract AF 18(600)1352, Human Factors Research, Inc.).** The problem of this investigation is to determine the feasibility of constructing job-knowledge examinations early in the procurement period. Test construction procedures used in developing the Written Examination of Mechanical Proficiency (WEMP) were employed except that in the initial stages the assistance of an aircraft manufacturer was obtained. Until now, technical assistance for the construction of WEMP examinations has come from Air Force personnel experienced in the maintenance of particular equipment. Suitable test outlines and items were developed for 2 examinations on maintenance of B-52 aircrafts, one for general mechanics and one for engine mechanics. To provide proficiency examinations on important new weapon systems even earlier, initial phases of test development can be carried out at the manufacturer's plant before Air Force personnel arrive for factory training. Trial administration will be with personnel attending the factory course and the final revision will be made after administration to the first operational unit.

- 89 **Votaw, D.F., Jr.** Review and summary of research on personnel classification problems. August 1956. (AFPTRC-TN-56-106, ASTIA Document AD-098 881) (Project 7702, Task 77057; Contract AF 18(600)369, Yale University). The report is divided into 3 sections; definition of the problem, methods of solution, and problem areas. In the first section, 2 main problems are defined: (a) Given a number of job categories with preassigned quotas, and given a group of persons for each of whom an amount of production in each job is known, the problem is to allocate persons to jobs so that production per person is a maximum. (b) Given a number of job categories with quotas and a group of persons, where each person is regarded simply as qualified or not in each job category, the problem is to find, if one exists, some allocation that will place each person in a job for which he is qualified. 10 methods of solution are listed, referenced, and discussed briefly in nonmathematical terms in Section 2. Section 3 summarizes present knowledge and suggests further research.
- 90 **Zaccaria, M.A., Schmid, J., Jr., & Klubeck, S.** A simple procedure for developing equivalent forms of interest or personality questionnaires. Psychol. Reps., 1955, 1, 37-41. (AFPTRC-TN-56-107, August 1956, ASTIA Document AD-098 882) (Project 7701, Task 77047). This paper reports a method for developing parallel forms of tests having scaled items ("like," "indifferent," "dislike") such as are commonly found in attitude, personality, and interest inventories. A preliminary form of the Officer Activity Inventory was administered to 591 newly-commissioned officers. Items for the 2 forms were paired, using 3 criteria: (a) pattern of correlations of the 3 responses with the subtest score; (b) popularity level of the "like" response; and (3) item content. Both forms, each with 16 subtests of 12 items each, were completed by the 512 members of OCS Class 52D. Applying Votaw's test of compound symmetry to the test data, it was found that only 3 of the 16 pairs of subtests failed to meet this rigid test of equivalence.
- 91 **Brokaw, L.D.** Technical school validity of the Airman Activity Inventory. August 1956. (AFPTRC-TN-56-109, ASTIA Document AD-098 884) (Project 7700, Task 77012). This study was performed to determine whether a specially constructed job interests inventory could add to the validity of the Airman Classification Battery in predicting technical school success. The 200-item instrument was administered with other experimental tests for validation against technical school grades. From the original sample who took the tests as basic airmen, graduates were selected from 13 schools representative of 6 aptitude clusters. The activity areas covered by the Inventory yielded validity coefficients which displayed little relationship to the intended job cluster. Sometimes validities for schools outside the cluster were higher than for those within the cluster. It is doubtful that material of this kind can make substantial contribution to a battery of aptitude measures.
- 92 **Gaier, E.L., McQuitty, L.L., & Cherry, C.N.** A procedure for developing job-knowledge tests. September 1956. (AFPTRC-TN-56-113, ASTIA Document AD-098 888) (Project 7700, Task 77016; Contract AF 33(038)25726, Task A, University of Illinois). The procedure was developed for groups selected in terms of aptitude and job knowledge and little relationship exists between job knowledge and proficiency on the job. Three 100-item job-knowledge tests, prepared from a pool of 12,668 mechanical test items, were administered to 645 Aircraft and Engine Mechanics grouped at 4 levels of formal training and work experience. Item responses were analyzed for power to differentiate between the 4 groups. The number of subjects passing many of the items increased with increased training or experience, but the reverse also occurred for a few items. The degree of significance of items in differentiating between groups of subjects was related to the parts of the airplane with which the items are concerned. Job knowledge taught in various phases of a course was differentially related to both the parts of an airplane and to the significance of items for differentiating subjects at various levels of training and experience. Subjects at different levels of training and experience did not show

- significant differences in aptitude. Accordingly, the differentiating power of the job-knowledge items is here attributed to differential learning and forgetting rather than to selective attrition.
- 93 Cox, J.A., Jr. & Christal, R.E. Development and validation of the Pilot Instructor Selection Examination. September 1956. (AFPTRC-TN-56-114, ASTIA Document AD-098 889) (Project 7701, Task 77036). Based on a review of previous research, 6 tests were constructed as potential predictors of success as flying instructors. These were administered to student pilots and student instructors along with the Aircrew Classification Battery. Grades from Pilot Instructor School and ratings by students, fellow instructors, and supervisors were correlated with test scores. It was found that test scores will predict grades in Pilot Instructor School, but are unrelated to the ratings of success as an instructor. Scores from the Pilot Instructor Selection Examination can be used effectively to select from graduates of basic pilot training men who will be successful in Pilot Instructor School, but these men are no more likely than unselected pilots to be rated high by their students, fellow instructors, or supervisors.
- 94 Gunn, R.L. An empirical study of the Job Components Check List. October 1956. (AFPTRC-TN-56-123, ASTIA Document AD-098 897) (Project 7950, Task 79500; Contract AF 18(600)82, Western Reserve University). This study was designed to obtain both job-defining information and criteria of performance for B-36 dock reciprocating-engine mechanics by means of 3 job components check lists of 101 tasks: the Task Difficulty Check List; the Frequency of Performance Check List; and the Task Assignment Check List. The Frequency of Performance and Task Assignment Check Lists were administered to a sample of 140 B-36 dock engine mechanics and to 36 of their immediate supervisors (engine chiefs). The Task Difficulty Check List was administered to 100 dock mechanics and to 50 dock supervisors. The Frequency of Performance Check Lists were factor analyzed to determine the job-defining function of the technique. The results indicated that the B-36 dock mechanic's job was not homogeneous. 5 factors were extracted which suggest that the job has "functional" divisions as well as "systems" divisions. These factors were differentially related to such variables as rank, experience, mechanical aptitude, and performance on the Written Evaluation of Mechanics' Performance (WEMP) B-36.
- 95 French, Elizabeth G. & Chadwick, Irene. Some characteristics of affiliation motivation. November 1956. (AFPTRC-TN-56-126, ASTIA Document AD-098 898) (Project 7704, Task 77101). A measure of affiliation motivation, a projective test, was administered to 144 male students in Officer Candidate School. 2 groups were equated on affiliation motivation score and on popularity as measured by a sociometric questionnaire. One group was given a second form of the test after completing a questionnaire designed to heighten affiliation motivation, and the other was given the second form following a neutral activity. Specific hypotheses were tested by analyses of variance of the scores for various subgroups and by chi-square comparisons of positive and negative responses. The results, which confirmed hypotheses, indicated that increasing affiliation cues in the environment produces an increase in the measure of affiliation motivation and that subjects who had initial high scores were more responsive to the stimuli than were subjects whose original scores were low. Popularity level was not related to overall level of affiliation motivation but it determines the extent to which the subject is goal- or threat-oriented.
- 96 Massey, Iris H. & Creager, J.A. Validation of the Airman Classification Battery: 1949-1953. November 1956. (AFPTRC-TN-56-129, ASTIA Document AD-098 903) (Project 7700, Task 77006). This report summarizes the available data on the validation of the Airman Classification Battery from 1949 to 1953. Validation is carried out by correlational techniques, including factor analysis, and by experimental methods designed to assess the effects of



various testing conditions. Regression analyses are continuously carried out using both training and proficiency criteria. The use of training criteria predominated during the period covered by this report. Occasional validation against phase criteria is used to keep abreast of changing requirements and to study heterogeneity of function within a specialty area. Considerable improvement in manpower utilization has been effected with this battery. Evidence demonstrates the batteries to be reliable instruments with validity for a wide variety of training criteria. Factor analytic studies indicate excellent coverage of verbal, numerical, and mechanical functions, but the need for greater coverage of spatial and reasoning abilities. Some differential validity is demonstrated which is limited by high intercorrelations among the aptitude indexes.

- 97 Chorness, M.H. & Nottelmann, D.A. The predictability of creative expression in teaching. December 1956. (AFPTRC-TN-56-130, ASTIA Document AD-098 905) (Project 7703, Task 77085). An attempt was made to relate scores derived from Guilford's creativity test battery to aspects of creative behavior in the teaching medium. 52 students were observed as they conducted lecture-discussion sessions at the Pilot Instructor School and rated on criterion areas considered demonstrative of creativity in instruction. Tests of creativity predicted grades in Pilot Instructor School as well as, but not significantly better than, intelligence test score. The same was true for prediction of the ratings of creativity.
- 98 Wrigley, C., Morsh, J.E., & Twery, R. A factor analysis of the Air Force Factor Reference Battery I. December 1956. (AFPTRC-TN-56-137, ASTIA Document AD-098 913) (Project 7700, Task 77016; Contract AF 33(038)25726A, University of Illinois). A factor reference battery was designed to provide for effective assessment of aptitudes of Air Force personnel and to determine the relationship of several factors to proficiency evaluation in shorter time than is required for the usual aptitude battery. The 14 tests were administered to 562 experienced B-47 aircraft and engine mechanics. A factor analysis yielded 11 significant principal axes factors which were rotated by the quartimax method. The common variance possessed by each test was determined by calculating the multiple correlation between each test and the other tests in the battery. 10 factors were interpreted as: Sensori-Motor Speed, Spatial Aptitude, Fluency, Induction, Verbal Aptitude, Clerical Speed, Mechanical Knowledge, Associative Memory, Deduction, and Perceptual Reorganization. On the basis of factor loadings and multiple correlations, it is suggested that Visualization, Motor Speed, Perceptual Speed, and Word Fluency tests be eliminated from the battery. The Verbal Knowledge and Mechanical Knowledge tests proved too easy and the Object Completion test too difficult for the subjects of this study.
- 99 Zaccaria, M.A., Tupes, E.C., & Lawrence, H.G. Development and characteristics of the USAF Officer Activity Inventory. January 1957. (AFPTRC-TN-57-15, ASTIA Document AD-098 927) (Project 7701, Task 77047). Development of an activity interest inventory is a first step toward bringing the area of interest testing to the level of aptitude testing for use in officer selection and classification. Materials from military and civilian job descriptions, Air Force classification manuals, and interviews with officers formed the basis for writing 606 items, allocated to 16 *a priori* subtests. From these, 2 alternate forms with 12 items in each subtest were constructed. From administration to newly-commissioned AFROTC officers, reliability and validity for selected criteria were estimated and shortened alternate forms were derived. Subtests of both the original and shorter forms are highly reliable and sufficiently independent with respect to each other and to aptitude and achievement tests to contribute to the usefulness of an officer classification battery. Preliminary studies show the subtests to be valid predictors of performance in some officer schools, but the validity coefficients were low.

- 100 Christal, R.E. & Krumboltz, J.D. Prediction of first semester criteria at the Air Force Academy. January 1957. (AFPTRC-TN-57-17, ASTIA Document AD-098 920) (Project 7719, Task 17009). This report provides an evaluation of the measures used in selection of the class of 1959 in terms of course grade criteria. The predictors were the 1955 Air Force Officer Qualifying Test (AFOQT), several College Entrance Examination Board tests, and some background variables. First semester grades in Academy courses and the Academy Aptitude for Commissioned Service rating are the criteria. Intercorrelations of predictors and criteria for the 271 cadets who completed the first semester, and intercorrelations of predictors for the 2610 physically qualified applicants are provided. The prediction instruments effectively predict course grades, but not the Aptitude for Commissioned Service rating. Reported validities are conservative estimates of the "true" validity because of the restricted range of talent found in the selected cadets. Additional tests measuring interests, abilities, and personality are needed to improve prediction in the few areas where validities are low.
- 101 Smith, R.G., Jr. & Cox, J.A., Jr. Methods of reduction of psychological stress due to radiation. February 1957. (AFPTRC-TN-57-19, ASTIA Document AD-098 922) (Project 7734, Task 17103). The report records the results of a survey of current industrial practices with respect to the problem. No attempt is made in this report to develop methods to reduce stress due to radiation at higher than medically permissible dose rates. No special stress problems need be expected in any Air Force nuclear establishment, *provided* (a) that radiation levels are below the nationally established maximum permissible exposure rates, (b) that safety indoctrination of a realistic nature is provided personnel working in a radiation field, and (c) that a general orientation, emphasizing the precautions taken, is given to other personnel and dependents. In the case of personnel who must work in higher levels of radiation, it is not known whether they will show stress to a greater degree. It is likely that some small increase in the radiation level may be made without increasing stress to a major level. To date, research on stress offers little really firm guidance as to ways of reducing stress effects. The consensus of industrial opinion agrees with psychological opinion that stress and anxiety may be reduced by providing realistic orientation about the situation and training people for emergencies.
- 102 Tupes, H.C. Psychometric characteristics of Officer Effectiveness Reports of OCS graduates. February 1957. (AFPTRC-TN-57-20, ASTIA Document AD-098 923) (Project 7719, Task 17009). OER scores from 1949 through 1952 were obtained for 1400 male OCS graduates. These were analyzed by OCS class, by date of OER, and by length of time elapsing between graduation from OCS and date of OER, with respect to their means, standard deviations, and reliabilities. Reliability was estimated both for a single report and an average of several reports. A dichotomous score conversion was developed. Except for a slight tendency for the mean OERs of recent OCS classes to be higher than those of earlier classes, there were no differences among means or standard deviations. There were slight tendencies for the reliabilities of OERs for more recent classes to be higher than those of earlier classes, and for OERs based on shorter lengths of time between OCS graduation and date of OER to be more reliable than OERs based on longer periods. None of the differences were large and it seems to make little difference with respect to predictability which OER is used as a criterion. The reliability of any single OER was so low (about .30) that an average score based on several OERs is necessary, either for research purposes or as the basis for decisions involving individual officers.
- 103 McMahan, C.A. & Associates. The "shortage" of scientific and engineering manpower in the United States. February 1957. (AFPTRC-TN-57-25, ASTIA Document AD-098 930) (Project 7722, Task 17101). This study surveys available information relevant to the so-called "shortage" of scientific and engineering manpower in an attempt to explain inconsistencies,

point out gaps in the information, and provide guidance for planning purposes. Some 29 agencies outside the Air Force were identified as being concerned with the problem. Conferences were held with representatives of some of these agencies, and much data and many publications dealing with the subject were reviewed. The results indicate that no definitive evaluation of the general shortage of scientific and engineering manpower has been provided, nor is it likely that any can be provided with the information and analytical techniques at hand. This is due in part to conflicting assumptions and definitions employed, but primarily to the fact that no clear measure of manpower requirements on a national scale is in evidence.

- 104 Tomlinson, Helen & Schmid, J., Jr. Use of a difference-score criterion in item analysis. *J. educ. Res.*, 1957, 50, 373-381. (AFPTRC-TN-57-27, February 1957, ASTIA Document AD-098 932) (Project 7702, Task 77061). In constructing aptitude tests, methods are needed for selecting items that measure one trait and rejecting items that measure a different trait. The task selected was development of a new form of the General Mechanics test that would have a lower correlation with the verbal test, Word Knowledge. Data were available from a pool of 160 general mechanics items administered to 680 basic airmen. Criterion samples for item analysis were 172 airmen with a positive difference score and 184 airmen with a negative difference score. Items selected for the purified test were positively related to the difference-score criterion. Items selected for a control test correlated with the General Mechanics score, but not with the difference score. Experimental and reference tests were administered to an independent sample of 430 basic airmen. The purified form of the General Mechanics test consistently showed significantly lower correlations with the verbal reference test than those of the original test. In addition, the purified form had consistently higher correlations with the original General Mechanics test than the control form.
- 105 Humphreys, L.G. The normal curve and the attenuation paradox in test theory. *Psychol. Bull.*, 1956, 53, 472-476. (AFPTRC-TN-57-29, March 1957, ASTIA Document AD-098 934) (Project 7702). It has generally been assumed that to increase the reliability of a test is to increase its validity. Loevinger's 1954 paper argued that, with the usual assumption of continuous, normal test-score distributions, test validities decrease when reliabilities rise above a certain level. This paper challenges the appropriateness of the assumptions that lead to this so-called attenuation paradox. Hypothetical examples, statistical inference, and logical argument are used to demonstrate that the paradox is a consequence of the often unwarranted assumption of normality of both test scores and criterion distributions. With the simpler and more realistic assumption that distribution of psychological measurements are rank-order point distributions, the attenuation paradox is shown to be nonexistent.
- 106 Schmid, J., Jr., Morsh, J.E., & Detter, H.M. Analysis of job satisfaction. In *The thirteenth yearbook of the National Council on Measurements Used in Education*, 1956. Pp. 45-52. (AFPTRC-TN-57-30, March 1957, ASTIA Document AD-098 935) (Project 7950, Task 17078). This study attempts a meaningful substructuring of job satisfaction. A job-satisfaction scale of 60 Likert-type items was given to 238 airmen who were receiving on-the-job training at one Air Force base. Homogeneous keying was applied to derive 3 scales: (a) Sense of Personal Achievement; (b) Attitude Toward Supervisors; and (c) Stress. Using items which appeared in one scale only as a basis for clusters, a bifactor analysis was performed. Both homogeneous keying and factor analysis showed that job satisfaction was not global, but structured. The scales produced by homogeneous keying were clarified by the factor analysis, but the same scales prevailed. One general factor was found in addition to the 3 group factors.
- 107 Austin, J.D. & Holloway, R.G. Operational feasibility tryout of the Experience Record, Form X-4. March 1957. (AFPTRC-TN-57-32, ASTIA Document AD-098 937) (Project 7700, Task 77015). The Experience Record was designed to be a device to select and classify

technically qualified personnel. This study compares the Experience Record with other techniques. 4 groups of 1000 male basic airmen were the subjects. An 86-item handscored occupational inventory, the Experience Record, was administered to 2 of the 4 groups. The first group was given the Experience Record under paced testing conditions prior to the classification interview. The second group was given the Experience Record under non-paced testing conditions prior to the classification interview. The third group was given only a biographical questionnaire designed to give the interviewer a quick summary of the recruit's background and occupational preferences. The fourth group, the control group, was given only a standard classification interview. Time records and accuracy of identification showed that the Experience Record can be used effectively to locate numbers of technically qualified airmen (by-pass specialists) if the classification interview is not conducted.

- 108      Chorness, M.H. & Nottelmann, D.A. The prediction of creativity among Air Force civilian employees. March 1957. (AFPTRC-TN-57-36, ASTIA Document AD-126 366) (Project 7719, Task 17011). This study was designed to determine whether current tests of creativity were valid determiners of the same talent manifested in the Air Force Incentive Awards Program. 65 civilian employees identified as recipients of money awards took a battery of tests measuring creative thinking. The tests identify factorial dimensions of Ideational Fluency, Originality, Spontaneous Flexibility, Redefinition, and Sensitivity to Problems. The group also completed a questionnaire containing items about hobbies, family life, and classroom factors. 65 employees who had never submitted a suggestion were matched with the criterion group on intelligence, education, and performance rating. Neither the 5 creativity factor composites nor the 3 parts of the Personal Data Questionnaire differentiated the 2 groups significantly. All 5 creativity factors were significantly correlated with personal data items on hobbies and extracurricular activities representative of creative activities.
- 109      Wrigley, C., Cherry, C.N., Lee, Marilyn C., et al. Use of the square-root method to identify factors in the job performance of aircraft mechanics. Psychol. Monogr., 1957, 71, No. 1 (Whole No. 430). (AFPTRC-TN-57-47, April 1957, ASTIA Document AD-126 377). This study was designed to identify some of the factors in the job performance of aircraft and engine mechanics. 200 items judged to be related to job performance were assembled and supervisors were asked to describe a "best," "poorest," or "average" mechanic of their own choosing in terms of responses to the items. A square-root factor analysis of correlations among items and the correlations between items and the "best-poorest" descriptions of mechanics identified items which supervisors consider most relevant to job proficiency. The 10 major factors were named: General Job Efficiency, Social Maladjustment, Executive Ability, Leadership, Personal Charm, Resourcefulness, Willingness and Adaptability, Orderliness, Ability to Motivate Others, and Mechanical Proficiency. Practical abilities were more necessary to success than general intellectual ability, and lack of motivation and a poor sense of responsibility are more detrimental than poor socio-emotional adjustment.
- 110      Tupes, E.C. & Christal, R.E. Psychological tests and the selection and classification of Air Force officers. April 1957. (AFPTRC-TN-57-52, ASTIA Document AD-126 383) (Project 7719, Task 17009). This report is a nontechnical review of research programs with a listing of 75 scientific publications produced by Air Force personnel research in this area. Contributions of psychological tests to officer selection for flying training and technical training are summarized. 5 graphic figures illustrate the efficiency of tests in selection. The directions in which current research is moving are indicated. Aptitude tests are generally used in officer selection programs but are not yet fully exploited in officer classification. As appropriate instruments are developed, wider use can be made of aptitude tests in the classification of officers. Development of motivation and personality tests related to proficiency in specific job areas may increase precision of officer classification and add to the effectiveness of officer selection programs.

- 111 **Krumboltz, J.D. Physical proficiency as a predictor of leadership. May 1957. (AFPTRC-TN-57-60, ASTIA Document AD-126 391) (Project 7719, Task 17009).** To evaluate measures of physical proficiency against interim leadership criteria, 3 populations which are sources of Air Force officers were sampled: OCS cadets, aviation cadets in preflight training, and preflight student officers (AFROTC graduates). 7 tests of physical characteristics and proficiency were administered at the beginning of their training program: Height; Weight; Medicine Ball Throw; Pullups; Hurdle Run; Hop, Step, and Jump; and the 250-yard Shuttle Run. Leadership peer ratings were used as the criterion of leadership. Multiple correlations with the criterion were compared with a composite equally weighted with 5 physical proficiency tests (omitting height and weight). The tests proved reliable and had useful validity for predicting leadership ratings in the groups considered here. The multiple correlations range from .17 to .36. For aviation cadets and OCS cadets, the equally-weighted composite of 5 predictors yielded validities about equal to those obtained from use of all predictors optimally weighted. For student officers, the multiple regression technique gave higher validity.
- 112 **French, Elizabeth G. Motivation as a variable in work-partner selection. J. abnorm. soc. Psychol., 1956, 53, 96-99. (AFPTRC-TN-57-63, May 1957, ASTIA Document AD-126 394) (Project 7704, Task 77101).** In many working or leadership situations individuals are faced with a choice between maximum performance and maximally pleasant personal relations. This study assessed the possibility of predicting the probability of choosing maximum performance. From data supplied by friendship ratings, 51 groups of 4 basic airmen were made up so that each group was composed of 3 mutual friends and one man the other 3 did not consider a friend. All took a test designed to measure relative strength of achievement and affiliation motivation. The members of each group worked individually on a task at which the nonfriend was permitted to succeed and the other 3 were made to fail. Then the airmen were asked to choose a partner to work on a similar task. The results showed that as the relative level of motivation shifted from high achievement - low affiliation to the reverse, the work-partner choices shifted from a single choice of the successful nonfriend through the choice of the success-person and the friend to the choice of both friends. Thus it is possible to determine which individuals have a high probability of making a performance-oriented rather than a friendship-oriented response in a conflict situation if relative strengths of achievement and affiliation motivation are known.
- 113 **Merck, J.W. & McMahan, C.A. Estimates of failures of the Armed Forces Qualification Test, 1956. June 1957. (AFPTRC-TN-57-67, ASTIA Document AD-126 398) (Project 7722, Task 17101).** The AFQT was designed to have the effect of eliminating the 10% of the total population in the registrant ages with the lowest aptitude. The purpose of this study was to estimate the rate of failure if the total male population in registrant ages took the AFQT. The estimated rate of failure was obtained by classifying the registrant population into homogeneous categories with respect to ability to pass the AFQT, establishing on an empirical basis the failure rate of each category; deriving from these data the total number of failures that might be expected; and finally estimating a single overall rate of failure. The results indicate that 10.9% of the total male registrant population would fail. Thus the established failure level falls within 1% of fulfilling its designed function.
- 114 **Whitcomb, M.A. & Travers, R.M.W. A study of within-test learning functions as a determinant of total score. Educ. psychol. Measmt., 1957, 17, 86-97. (AFPTRC-TN-57-81, June 1957, ASTIA Document AD-134 201) (Project 7703).** This study presents 2 attempts to determine the presence of transfer of training from item to item in selected types of aptitude items. In experiment I, 4 test items for each of 3 kinds of aptitude test were administered in all 24 possible orders to 432 airmen. The items were scored for the number passing each item position. Item positions were intercorrelated to see whether adjacent items were more highly

related than nonadjacent items. 2 of the 3 types of items showed learning, with the proportion passing increasing from .45 in position 1 to .58 in position 4. The third item type was easier than the others and showed no within-test learning effects. In experiment II, 23 items were presented as a test in which the first and last 5 items were arranged in a Latin square design. The percentage of subjects passing each item continued to rise to the eighth item position, where it leveled off and then fell in the last segment of the test. Results of both studies demonstrate learning effects over the initial items of certain aptitude tests, but fail to demonstrate that this learning changes the function measured by the items.

- 115 **Krumboltz, J.D. The relation of extracurricular participation to leadership criteria. Personnel Guid. J., 1957, 35, 307-314. (AFPTRC-TN-57-82, June 1957, ASTIA Document AD-134 202) (Project 7701).** Published studies were reviewed for what evidence exists that participation in high school and college activities is predictive of future success as a leader. No conclusive evidence exists that high-school extracurricular participation either has or has not a positive relationship to adult leadership. While a slight positive relationship is shown in some studies, the methodological faults preclude any conclusions. It is not known whether a person active in high school will tend to remain equally active in college. There is some evidence that college extracurricular participation is indicative of future leadership, although the extent of the relationship may depend on other factors such as the occupation of the group involved and the specific criterion used. These results suggest that high-school extracurricular participation should be used with extreme caution, as a selection instrument. College participation can be used with somewhat more confidence.
- 116 **Harding, F.D., Jr. & McWilliams, J.T., Jr. Language aptitude tests as predictors of success in a six-month Russian course. June 1957. (AFPTRC-TN-57-86, ASTIA Document AD-134 206) (Project 7776, Task 67641).** Because of high failure rates in some language courses, a 4-week trial course was set up as a screening device. As a possible cheaper alternative, language aptitude tests were evaluated to determine their effectiveness as selectors of trainees for a 6-month Russian course. Using a Language Aptitude Composite Score derived from 4 tests of the Psi Lambda Foreign Language Aptitude Battery, 2 classes were selected. From correlation of aptitude scores with course grades and comparison of attrition rates in classes selected by the 2 methods, it was found that the aptitude tests were as effective as the trial course in selecting trainees. Results of a cost analysis indicate that use of aptitude tests would reduce selection costs about \$850 per trainee selected.
- 117 **Tupes, E.C. A proposal for an officer effectiveness selection battery based on measures obtainable during Basic and Advanced AFROTC. June 1957. (AFPTRC-TN-57-87, ASTIA Document AD-134 207) (Project 7719, Task 17009).** The purpose of this report is to review possible officer effectiveness measures and to recommend a valid and feasible selection battery which would be useful in officer selection programs. Possible procedures were considered with respect to their validity for relevant criteria of officer effectiveness and to their feasibility (ease of administration and scoring, whether subject to coaching) for selection in the AFROTC program. An officer effectiveness selection battery is described which would be valid for the measurement of officer effectiveness and suitable for use in the AFROTC program and, with some modification, in other officer selection programs. It would consist of 5 procedures: (a) a standardized country-wide evaluation system based primarily on ratings by peers, cadet officers, and staff officers; (b) ratings by peers on a number of personality traits; (c) a comprehensive biographical-interest-personality inventory based on presently available items of demonstrated validity; (d) a physical proficiency test battery; and (e) a situational performance test series.

- 118 Fruchter, Dorothy Anne, Brokaw, L.D., & McReynolds, Jane. Effects of speed and difficulty level on the factorial content of spatial tests. June 1957. (AFPTRC-TN-57-89, ASTIA Document AD-134 232) (Project 7700, Task 77000; Contract AF 33(038)11046, University of Texas). This paper reports an investigation of the effect of speeding on the factorial content of spatial tests, the effect of item difficulty level on the factorial content of spatial tests, and the relative factorial content of Rights and Wrongs scores from speeded spatial tests. 9 tests, providing 15 scores, were given to 241 basic airmen. 5 of the tests (11 scores) were experimental spatial tests. The other 4 were standard Air Force reference tests. 2 of the spatial tests were unspeeded, 2 were speeded, and the fifth was administered part speeded and part power. A correlation matrix of the 15 scores was factor analyzed by the centroid method. Graphical orthogonal rotation produced 2 factors each specific to one test, and 3 others identified as Visualization, Spatial Relations, and Perceptual Speed. No general space factor appeared. Difficult items were no better measure of Visualization than were easy items. Wrongs scores load more heavily on Visualization, Rights on Perceptual Speed.
- 119 Whitcomb, M.A. Application of homogeneous keying to spatial relations items. July 1957. (AFPTRC-TN-57-91, ASTIA Document AD-134 211) (Project 7719, Task 17011). A homogeneous keying technique was applied to responses of 100 basic airmen to 180 test items selected to sample items used in spatial relations tests. The resultant tests were checked for stability of their reliabilities and intercorrelations on an independent sample of 500 airmen. The spatial relations tests developed, though not long enough to be immediately useful, can easily be lengthened. The method furnishes much the same information as factor analysis, but the product of the method is a set of independent tests ready for use. The pool of items selected for keying determines both the number and homogeneity of the tests produced. Therefore it is important to determine the range of item variety, to equalize the number of items of each type, and to limit the range of item difficulty so that the tests produced will be closely tailored to the proposed use.
- 120 Krumboltz, J.D. & Christal, R.E. Predictive validities for first-year criteria at the Air Force Academy. July 1957. (AFPTRC-TN-57-95, ASTIA Document AD-134 218) (Project 7719, Task 17009). The present study evaluates the effectiveness of a number of devices in terms of their ability to predict course grades and ratings available for Academy cadets at the end of their first year of training. The predictors were the 1955 Air Force Officer Qualifying Test (AFOQT) including all subtests and composite scores, several College Entrance Examination Board aptitude and achievement tests, a revised Activity Index, and other variables. Correlations of predictors with criteria and intercorrelations among the criteria are presented. The validities are generally high in spite of the considerable restriction due to selection and attrition. The Aptitude for Commissioned Service rating and course grades in philosophy are not well predicted. Additional tests measuring abilities, interests, and personality traits should be tried out in an effort to improve prediction in areas where validities are low.
- 121 Borg, W.R. The behavior of emergent and designated leaders in situational tests. Sociometry, 1957, 20, 95-104. (AFPTRC-TN-57-101, July 1957, ASTIA Document AD-134 222) (Project 7719, Task 17009). This paper reports observation of the emergence of leaders in initially leaderless groups and compares the efficiency of groups when individuals with varying degrees of leadership skill are designated as leaders. 41 teams, each of 6 men, were formed from OCS classes 55B and 55C. The test consists of 12 situational problems all requiring cooperation of team members and providing a situation in which sound leadership is important in successful solution. In the first 6 problems, no leader was designated. In the remaining 6 problems each member of the team was in turn designated leader. Observers marked on a checklist occurrence of defined types of leadership behavior. In the first 6 problems 3 types

of teams were identified: 17 in which one leader clearly emerged; 14 in which no leader emerged; and 10 in which 2 competing leaders emerged. Results showed that selection of an effective leader stimulates problem-solving behavior among teammates rather than suppressing such behavior. Designation of an ineffective leader reduces the overall effectiveness of the team and suppresses emergence of an effective leader.

- 122 Kamenetzky, J. & Schmidt, H. Effects of personal and impersonal refutation of audience counterarguments on attitude change. *J. abnorm. soc. Psychol.*, 1957, 54, 200-203. (AFPTRC-TN-57-102, July 1957, ASTIA Document AD-134 223) (Project 7705, Task 77115; Contract AF 33(038)25726, Task F, University of Illinois). 2 scripts on a controversial subject were prepared, identical except that one used the second-person pronoun in 27 places while the other used third-person nouns or pronouns. The counterarguments were against the side generally held by the subjects, 216 college men. 2 experimental treatments and 1 control treatment were administered. A pretest and posttest attitude questionnaire measured attitude change. The posttest included a questionnaire on reactions to the speech. Analysis of variance techniques were applied with classification by treatments and initial attitude levels. Personal refutation produced no greater attitude change or discounting tendencies than did impersonal refutation. Both experimental groups showed mean attitude changes that demonstrated persuasiveness of the counterarguments in either form. These findings suggest that the content of the refutation is more effective in influencing attitude change than the manner of presentation.
- 123 Thorndike, R.L. The optimum test composites to predict a set of criteria. July 1957. (AFPTRC-TN-57-103, ASTIA Document AD-134 224) (Project 7719, Task 17008; Contract AF 18(600)1208, Teachers College, Columbia University). A technique developed by Tucker was applied to the intercorrelations of the Airman Classification Battery and to validity coefficients for the tests in this battery for 46 training schools. The technique uses a series of matrix transformations, and yields a set of orthogonal composites of the original test scores such that the first composite accounts for the maximum amount of predictable criterion variance, and each following one accounts for the maximum amount of residual predictable criterion variance. Regression weights of the criterion variables on the first 8 composites were computed. The first 4 "principal composites" were then rotated in an attempt to achieve simple structure. Rotation of the first 4 principal composites in an attempt to achieve simple structure yielded 4 rather highly correlated composites. One related to verbal nontechnical jobs, one to high-level technical and engineering jobs, one to less intellectual mechanical jobs, and one to a group of unspecialized and nonintellectual jobs. The first principal composite accounted for as much overall criterion variance as either (a) the most valid of the 4 oblique composites or (b) the aptitude index used to classify airmen.
- 124 Morsh, J.E. The development of Air Force Factor Reference Battery II. July 1957. (AFPTRC-TN-57-104, ASTIA Document AD-134 225) (Project 7950, Task 17078). The purpose of this study was to determine the extent to which test characteristics of selected factor reference tests remain adequate after they have been shortened. On the basis of earlier research, 11 shortened tests were assembled, 10 of which were set up for machine scoring and one, Ideational Fluency, could be rapidly scored by hand. The Battery required one hour for administration. It was given twice to 222 basic airmen and 88 Recruiter School students, and once to 206 USAF Academy cadets. Test reliabilities, intercorrelations, and correlations with a large number of other tests were determined. The FRB II tests, despite their brevity, have satisfactory reliability. Several of the tests can be used to identify certain relatively pure factors.
- 125 Kelley, T.L. Development of an Activity Preference Test. July 1957. (AFPTRC-TN-57-107, ASTIA Document AD-134 228). (Project 7700; Contract AF 33(038)13632, Educational Research Corporation. Components of individual behavior are identified and measured through



responses to a comprehensive questionnaire on activity preferences. The investigation follows up development and analysis of an Activity Preference Test with wartime Army samples by revising the test and verifying component scaling for airman samples. The test has 4 sections with alternate forms for all but the first section. The first section asks for biographical information as remembered at age 13½; the second section asks for activity preferences as remembered at age 13½; the third section asks for present preferences; and the fourth section asks for presumed preferences at age 45. It was revised to make it suitable for the airman age range and for both men and women. A chart form was developed for profiling individual and group component scores. Of the 15 components identified previously, 10 are retained which are bipolar in character so that both high positive and high negative scores may have meaning for differential prediction. Component scores derived from a simplified scoring method proved less reliable for most of the components than scores based on the original technique. The profile chart proved effective for showing individual deviations from group norms, and for identifying group patterns.

- 126      McQuitty, L.L. Isolating predictor patterns associated with major criterion patterns. Educ. psychol. Measmt., 1957, 17, 3-42. (AFPTRC-TN-57-113, August 1957, ASTIA Document AD-134 236) (Project 7700, Task 77016; Contract AF 33(038)25726, University of Illinois). A review was made of pattern-analytic methods for the analysis of unordered data in relation to the problem of isolating patterns of successful behavior. A method of pattern analysis was especially designed to yield additional light on the nature of the organization of successful behavior and applied to test data from 240 aircraft and engine mechanics. The predictive instruments included a self-descriptive inventory, a job-satisfaction inventory, and a job-knowledge test. The criterion was the Airman Performance Report, Form 75, consisting of 6 rating scales: Adjustment to Others, Technical Knowledge, Performance of Duties, Supervisory Ability, Overall Performance, and Qualifications for Promotion. The results support an earlier finding that responses to test items are organized into many patterns of behavior.
- 127      Harding, F.D. A survey of incentives for hazardous or unpleasant working conditions. August 1957. (AFPTRC-TN-57-115, ASTIA Document AD-134 240) (Project 7734, Task 17103). A survey of personnel practices within applicable industry and governmental agencies was made to ascertain the kinds of incentives used in motivating people to expose themselves to hazardous or unpleasant working conditions. At present, no base of systematic information exists on which to build a theory of incentives for hazardous or unpleasant work. Most incentives in use for this purpose have developed through supply and demand. Increased remuneration, company-bought work clothes, and paid cleanup time are the most common incentives used. Management generally does not favor the paying of such premiums, while labor's views are mixed. In the Armed Forces the practice of offering hazard pay for certain duty has become accepted. As such duty is voluntary, it appears that supply and demand has been the chief determinant. More information is needed about the nature of incentives for hazardous or unpleasant work before they can be applied with assurance of their effectiveness.
- 128      Tupes, E.C. Relationships between behavior trait ratings by peers and later officer performance of USAF Officer Candidate School graduates. October 1957. (AFPTRC-TN-57-125, ASTIA Document AD-134 257) (Project 7719, Task 17009). This study investigates the relationship between ratings of personality traits by peers in an officer training situation and later Officer Effectiveness Report (OER) ratings. For 790 candidates in 6 classes, ratings on 30 behavior traits were obtained on each member from every other member of his flight. 14 cluster scores were developed based on intercorrelations of the 30 traits. A multiple regression equation between the cluster scores and the effectiveness score served as the basis of a simplified trait composite score. A majority of the trait variables had substantial validity against the criterion. The multiple correlation with OERs was nearly equal to the reliability of the

criterion. Class-by-class validities of the simplified composite varied considerably, but variations were unrelated to differences in rating conditions. The validities of the composite were as high as those for OCS military grades or academic grades. The valid personality traits reveal the high-rated officer as mature, well-adjusted, intelligent, assertive, well-motivated, socially poised, cooperative, and independent-minded.

- 129 **Flyer, E.S. & Carp, A. Retention of rated AFROTC officers. October 1957. (AFPTRC-TN-57-126, ASTIA Document AD-134 258) (Project 7719, Task 17010).** The purpose of this study was to identify factors associated with career attitudes among AFROTC pilot training graduates and to devise methods for increasing their retainability. Data were evaluated to determine differences between career and noncareer student pilots on performance in training, socio-economic and educational background, aptitude factors, and biographical inventories. 400 graduates of basic pilot training were interviewed about factors relevant to their decision concerning an Air Force career. The studies indicate that career interest is highly related to attitudes toward flying, attitudes toward military life, and job opportunities in civilian life. In the AFROTC population, individuals with high career potential could be identified as early as the sophomore year in college. Changes in the training program with respect to the "officer" role of the AFROTC graduate as a pilot trainee would increase the overall motivational level and career retention rate of the AFROTC graduate.
- 130 **Creager, J.A. Discriminant analysis and its role in the classification of airmen. November 1957. (AFPTRC-TN-57-127, ASTIA Document AD-134 259) (Project 7719, Task 17008).** The basic issues of discriminant analysis, methodology, and applications are reviewed critically from the viewpoint of potential application to the selection and classification of airmen. Relations among discriminant, regression, and allocation models are discussed. While the basic issues and methods of discriminant analysis are simple in principle, development leading to utility in airman assignment decision is complicated by effects of prior allocation. Further research should be concentrated on developing appropriate criteria for defining groups to be discriminated, and to clustering of jobs in terms of the ability of the classification battery to make discriminations.
- 131 **Woodworth, D.G. & MacKinnon, D.W. The measurement of intellectual efficiency in an assessment of 100 Air Force captains. November 1957. (AFPTRC-TN-57-128, ASTIA Document AD-134 260) (Project 7730; Contract AF 18(600)8, Institute of Personality Assessment and Research, University of California, Berkeley).** 17 measures of intellectual functioning obtained in an extensive psychological assessment of 100 Air Force captains were subjected to a factor analysis. 4 major factors emerged: functionally effective general intelligence, visual form-problem solving ability, effectiveness and originality in complex problem solution, and overall general effectiveness. When factor scores were correlated with 11 criteria which were assumed to measure general officer effectiveness, it was found that the criteria of officer effectiveness were not predictable from the factor scores. Extreme caution should be exercised when using certain standard Air Force tools (e.g., Officer Effectiveness Reports) in evaluating the intellectual efficiency of officers because they may not be valid for this purpose.
- 132 **Woodworth, D.G., Barron, F., & MacKinnon, D.W. An analysis of life history interviewer's ratings for 100 Air Force captains. November 1957. (AFPTRC-TN-57-129, ASTIA Document AD-146 401) (Project 7730; Contract AF 18(600)8, Institute of Personality Assessment and Research, University of California, Berkeley).** As part of an assessment program of 100 captains, life history interviews were conducted and each captain was rated by his interviewer on 10 areas of personal development and adjustment. A centroid factor analysis was made of the intercorrelations among the 10 variables, identifying 4 factors: (I) drive for professional achievement; (II) stability of present adjustment; (III) personal scope and capacity for

achievement; and (IV) character structure and mode of adjustment. Correlations of the resultant factor scores with measures of officer effectiveness showed that factors I and IV were good predictors of promotion board ratings.

- 133** Gordon, Mary Agnes. Interaction of experience and aptitude in predicting success in training courses for airplane and engine mechanics. November 1957. (AFPTRC-TN-57-133, ASTIA Document AD-146 406) (Project 7719, Task 17008). Previous studies have shown that aptitude tests predict training grades differently for men and women and for men from different regions. The studies reported explore regional differences in background, the influence of background factors on the prediction of mechanical training grades, and the effect of different backgrounds at various stages in training. Differences in background may be measured either by biographical information or by the difference between comprehension and information scores on mechanical aptitude tests. It was found that mechanical experience was correlated more with mechanical aptitude than with final school grades. It was demonstrated that a biographical measure of mechanical experience could be used to correct mechanical aptitude scores and thus improve the prediction of grades. Previous mechanical experience was a greater advantage in the final than in the initial phase of training. In using a mechanical aptitude composite to predict success in training, some correction for differences in previous experience should be considered.
- 134** Judy, C.J. & Adair, J.G. A comparison of two groups of mechanics on specific maintenance knowledge. December 1957. (AFPTRC-TN-57-139, ASTIA Document AD-146 413) (Project 7950, Task 17075). 2 questions were asked with respect to 8 areas of knowledge covering the maintenance of an important new weapon system: (a) Is there a difference in test performance of field trained mechanics as compared with technical-school trained mechanics? (b) Is there a difference at particular levels of mechanical aptitude and maintenance experience in the test performance of these 2 groups of mechanics? For none of the knowledge areas was there a statistically significant difference in favor of either group. But at particular levels of mechanical aptitude and maintenance experience, regions of significance were identified where one group was distinctly superior. Except for 2 knowledge areas, field training seemed generally best for high-aptitude, high-experience mechanics; technical-school training seemed generally best for low-aptitude, low-experience mechanics.
- 135** Tupes, E.C., Carp, A., & Borg, W.R. Validation of a proposed officer effectiveness selection battery. December 1957. (AFPTRC-TN-57-141, ASTIA Document AD-146 415) (Project 7719, Task 17009). Selection procedures now in use in the various officer programs are designed to insure that accepted candidates have the needed aptitudes to profit from officer technical training courses; but no systematic selection is being made with respect to officer effectiveness potential. Procedures designed to predict officer effectiveness were administered to 2 OCS classes at the start of training and validated against performance in training and against an intermediate criterion of officer effectiveness. 14 of the 22 measures studied were significantly valid for prediction of the intermediate criterion. A composite based on the unit-weighted combination of these measures would increase the efficiency of present selection procedures and could probably contribute to the selection efficiency in other officer programs.
- 136** Gordon, Mary Agnes. Patterns of mechanical background and aptitude. Educ. psychol. Measmt., 1957, 17, 408-415. (AFPTRC-TN-57-137, November 1957, ASTIA Document AD-145 411) (Project 7719, Task 17008). To determine the influence of background factors and tested mechanical aptitude on success in mechanical training, 577 graduates of an Airplane and Engines Mechanics course were categorized into 16 groups according to their high or low status on each factor. Status on the background factors (opportunity for gaining mechanical information, preference for mechanical activities, urban or rural background, and mechanical

experience) was determined by responses on a self-report questionnaire (biographical inventory). Patterns were compared by differences in percentage above the median course grade in training. Results showed that mechanical background contributes to training success mainly through selection for training on the basis of mechanical information scores and that excess of experience over information reduces chances of success.

- 137 McQuitty, L.L. A pattern analysis of descriptions of "best" and "poorest" mechanics compared with factor-analytic results. Psychol. Monogr., 1957, 71, No. 17 (Whole No. 446). (AFPTRC-TN-57-155, December 1957, ASTIA Document AD-152 119) (Project 7700, Task 77016; Contract AF 33(038)25726, University of Illinois). A kind of pattern analysis, agreement analysis, is developed and applied to rated characteristics of Air Force mechanics selected as best and poorest by their supervisors. Results identify several, rather than a single, types of best and poorest mechanics. Results of a factor analysis are compared with those of the agreement analysis, showing the complementary nature of information from both kinds of analysis.
- 138 Brokaw, L.D. & Burgess, G.G. Development of Airman Classification Battery AC-2A. June 1957. (AFPTRC-TR-57-1, ASTIA Document AD-131 422) (Project 7700, Task 77008). An aptitude test battery has been used in counseling and assigning airman recruits since 1948. New forms are introduced as changes in Air Force requirements and advances in testing procedures permit major improvements. The form adopted by the Air Force in January 1956 provided 14 test scores differentially combined in 5 aptitude indexes: Mechanical, Administrative, Radio Operator, General, and Electronics. From a standardization administration to 2000 airmen, scores were converted to a 20-interval centile scale. Reliabilities proved equal to the previous battery and intercorrelations among aptitude indexes were considerably reduced, thus improving accuracy of classification.
- 139 Thorndike, R.L. & Hagen, Elizabeth P. Attitudes, educational programs, and job experiences of airmen who did not reenlist. June 1957. (AFPTRC-TR-57-2, ASTIA Document AD-134 209) (Project 7719, Task 77010; Contract AF 18(600)1359, Teachers College, Columbia University). A survey by interview or questionnaire of 750 one-term former airmen representing 7 career fields was designed to identify reasons for nonreenlistment. Analyses of responses showed that men interested in reenlistment are likely to be in low priority career fields, to be uninterested in continuing their education, to have low aptitude indexes, and to receive low pay on their civilian jobs. Over 50% of the men were continuing their education and 25% were in jobs related to their Air Force specialty. Income averaged a little higher than Air Force pay, excluding retirement benefits, but less when all benefits are included.
- 140 Eilbert, L.R., Glaser, R., & Hanes, R.M. Research on the feasibility of selection of personnel for duty at isolated stations. With Appendix, Annotated bibliography of research on personnel problems associated with Arctic duty, by L.R. Eilbert & R. Glaser. July 1957. (AFPTRC-TR-57-4, ASTIA Document AD-134 241) (Project 7776, Task 67612; Contract AF 41(657)74, American Institute for Research). Objectives were to identify variables that might be useful in selecting men for assignment to isolated Arctic bases. 648 men were tested and interviewed at 8 Arctic bases. Supervisors' nominations of well adjusted and poorly adjusted men identified 2 criterion groups. Variables which differentiated the criterion groups were personality and background characteristics that may be of long standing and unrelated to the conditions of Arctic isolation. Hence a man's history of adjustment may be the best predictor of adjustment to an isolated Arctic environment.
- 141 Thorndike, R.L., Hagen, Elizabeth P., Orr, D.B., et al. An empirical approach to the determination of Air Force job families. August 1957. (AFPTRC-TR-57-5, ASTIA Document AD-134 239) (Project 7719, Task 17008; Contract AF 18(600)1208, Teachers College, Columbia

University). This study tries out a technique for assessing job requirements and for grouping jobs into homogeneous job families. A job activities questionnaire, with the items designed to be "pure" measures of a single job aspect, was filled out by airmen representing 25 AFSCs. From responses, a profile of job requirements was determined for each AFSC. By computing "distances" between each pair of profiles, job clusters were defined by grouping together AFSCs with the least distance between profiles of job requirements. Scores for the different aspects showed substantial correlation, and the definitions of job clusters proved not very informative, but the technique clearly separated mechanical from nonmechanical jobs, and supervisory from nonsupervisory jobs. This technique is not likely to prove useful unless more and better items are developed for the scales of job requirements.

- 142      **Matthews, J. & Lupfer, B.** Development of tests to measure nonintellectual aspects of officer aptitude. August 1957. (AFPTRC-TR-57-6, ASTIA Document AD-134 243) (Project 7701; Contract AF 33(038)10587, American Institute for Research). From inventories of critical officer behaviors, 36 nonintellectual behaviors were identified. These were grouped into 4 areas for each of which sets of test questions were constructed. A Criterion Report Sheet was devised for collection of criterion data. Officer Candidate School classes provided test and criterion data for validation analyses. There was no evidence that the Criterion Report Sheets discriminated between the 4 behavior areas, since intercorrelations were about as high as reliability estimates. Correlations of the tests with corresponding criterion measures were no higher than with the ratings in other behavior areas. The new tests showed no practical relationship with any of the various criteria. The basic problem in measuring nonintellectual aptitudes remains the development of a useful, predictable criterion.
- 143      **Combs, J.W., Jr.** Estimates of the male population, 18-29 years old, by States, 1960. November 1957. (AFPTRC-TR-57-10, ASTIA Document AD-146 402) (Project 7736). The Air Force Recruiting effort requires information concerning the geographic distribution of potential Air Force recruits. The method used was a variant of extrapolation from observed trends adaptable to electronic computers. Data were observed population changes by single years of age between 1940 and 1950 and estimated changes by broad age groups between 1950 and 1955 upon the basis of which probable changes over the period 1955-1960 were determined. On the basis of the projections, about one-fourth of the States can be expected to gain or lose less than 5% of their male populations, ages 18-29, during the decade 1950-1960. Gains greater than 5% may be expected in 14 States, and losses greater than 5% are anticipated in 20 States and the District of Columbia.
- 144      **Torrance, E.P., Rush, C.H., Jr., Kohn, H.B., et al.** Factors in fighter-interceptor pilot combat effectiveness. November 1957. (AFPTRC-TR-57-11, ASTIA Document AD-146 407) (Project 7680). Officially recorded data on 749 F-86 pilots with combat tours in Korea were analyzed for differences in background and personal data. Then 31 aces were matched with 31 nonaces for rank, age, and World War II experience and compared on variables derived from interviews, questionnaires, and Rorschachs. Rank, age, time in service, and flying time were all positively related to claim scores, but aptitude test scores were not. 5 scales derived from a Life Experience Inventory and 3 Rorschach scores differentiated aces from nonaces. Aces tried harder than nonaces for combat assignments.
- 145      **Fitzpatrick, R. & Cullen, J.W.** Prediction of airman reenlistment. December 1957. (AFPTRC-TR-57-12, ASTIA Document AD-146 416) (Project 7719, Task 17010; Contract AF 41(657)12, American Institute for Research). From interviews with 169 airmen near the end of their first Air Force tour, it was found that those reenlisting were likely to differ from nonreenlistees in family and social background and in attitudes toward the Air Force. Information from the interviews was used to assemble a variety of personal history, interest,

and attitude inventories which were given to 448 airmen representing 3 career fields: Electronics, Mechanical, and Supply. Multiple correlations to predict reenlistment ranged from .69 to .71 for the 3 career fields, but the characteristics entering into the equations differed. A composite to predict reenlistment would have to take into account the career field for which the man qualifies.

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